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No. 1

MOTORIZED VS. HORSE-DRAWN FIRE APPARATUS

IN a consideration of the respective value and merit of motor equipment and horse-drawn equipment, one item which is worthy of attention is in connection with fire-fighting apparatus in winter. The City of Washington, D. C., has recently suffered from an unusually severe snow storm. For several days after the storm, the fire department has been comparatively ineffective in dealing with fires owing to the inability of the motorized apparatus to reach the scene of action. In at least one instance, according to newspaper reports, a house burned down after three different fire companies had failed to break through the snow drifts to the fire. Some equipment was pulled to the fire by commandeered horses, too late to be of use. In several instances the heavy fire engines were stalled on snowy hills about the city. About six years ago Detroit had a blizzard with a temperature of 13° below zero and a high wind. At that time the motorized equipment of the fire department was practically a complete failure. The motors were stalled in drifts all over the city and the horse-drawn apparatus saved the day, so far as fire control was concerned. Other cities have had similar experiences.

Such experiences show quite clearly the utter impropriety and inadvisability of complete motorization of fire departments in cities where in any years snow storms of any magnitude are experienced. Under suitable weather conditions motorized apparatus has a distinct advantage over horse-drawn apparatus. But under other conditions, motorized apparatus may be absolutely valueless and total motorization of a fire department may conceivably lead to the destruction of a city by fire. It may be that motorized apparatus capable of quickly reaching fires through snow drifts, in spite of high winds, low temperatures and high hills, may some day be developed, but such apparatus does not exist today. We are confronted by a condition, one which involves serious menace to life and property, and, as matters stand, all cities in the snow belt should retain an adequate reserve of horse-drawn fire equipment for emergency use. The cost of maintenance is a small matter compared with the potential loss from the lack of such equipment. This is a matter which deserves the attention and should command the support of veterinarians wherever occasional deep snows occur. The veterinarian should actively combat the complete motorization of the fire department in his vicinity under these conditions. We would further suggest that the Horse Association of America compile statistics in connection with losses due to motorization of fire departments and bring their findings to the attention of city authorities throughout this country.

M. C. II.

NUMBER AND VALUE OF FARM ANIMALS

A RECENT Government report gives the following estimates of livestock on farms and ranches of the United States.

The abnormal demand for all classes of farm animals which was caused directly or indirectly by the late war, resulted in a marked increase in the value of livestock as well as other farm products, which could not be expected to continue long after peace was declared. Since the close of the war, there has been a steady decrease in our production of farm animals. With the exception of swine and milk cows, we produced fewer animals in 1921 than in 1920. The most alarming feature of this report is the great decrease during the past three years, in the

value of farm animals. A reduction in the value of horses, cattle, sheep and swine affects the veterinary profession directly as farmers do not give as much attention to the health of their animals as they do when they are more valuable.

FARM ANIMALS.	NUMBERS.		VALUES.		
	PER CENT OF PRECEDING YEAR.	TOTAL NUMBER.	PER HEAD.	AGGREGATE.	
Horses.....	Jan. 1, 1922	99.4	19,099,000	\$70.48	\$1,346,154,000
	Jan. 1, 1921	97.2	19,208,000	84.31	1,619,423,000
	Jan. 1, 1920	96.8	19,766,000	96.51	1,907,646,000
Mules.....	Jan. 1, 1922	99.7	5,436,000	88.26	479,806,000
	Jan. 1, 1921	100.5	5,455,000	116.69	636,568,000
	Jan. 1, 1920	101.8	5,427,000	148.42	805,495,000
Milk Cows.....	Jan. 1, 1922	101.8	24,028,000	50.97	1,224,767,000
	Jan. 1, 1921	99.5	23,594,000	64.22	1,515,249,000
	Jan. 1, 1920	100.6	23,722,000	85.86	2,036,750,000
Other Cattle.....	Jan. 1, 1922	98.4	41,324,000	23.78	982,666,000
	Jan. 1, 1921	96.8	41,993,000	31.36	1,316,727,000
	Jan. 1, 1920	99.3	43,398,000	43.21	1,875,043,000
Sheep.....	Jan. 1, 1922	96.3	36,048,000	4.80	173,159,000
	Jan. 1, 1921	96.0	37,452,000	6.30	235,855,000
	Jan. 1, 1920	96.4	39,025,000	10.47	408,586,000
Swine.....	Jan. 1, 1922	101.6	56,996,000	10.06	573,405,000
	Jan. 1, 1921	94.5	56,097,000	12.97	727,380,000
	Jan. 1, 1920	96.2	59,344,000	19.07	1,131,674,000

The number *not* on farms, i. e., in cities and villages, is not estimated yearly, but their number in 1920 as reported by the census was: Horses, 1,705,611; mules, 378,250; cattle, 2,111,928; sheep, 450,742; swine, 2,638,389.

Following changes in farm animals compared with January 1, 1920, are indicated: In total value, horses decreased \$561,492,000; mules decreased \$325,689,000; milk cows decreased \$811,963,000; other cattle decreased \$892,377,000; sheep decreased \$235,427,000; and swine decreased \$558,269,000 in the two years from January 1, 1920, to January 1, 1922.

The total value on January 1, 1922, of all animals enumerated above was \$4,779,957,000, as compared with \$8,165,194,000 on January 1, 1920, a decrease of \$3,385,237,000, or 41.5 per cent in the two years.

ANIMAL PETS AT THE WHITE HOUSE

AS yet the only animals to become identified with the new occupants of the White House are "Laddie Boy," the Airedale, and "Oh Boy," the English bull dog, presented to President Harding.¹ Both dogs are good Americans without aristocratic or exclusive notions. Although "Laddie Boy" is not what is termed a "one-man dog" and inclined to be friendly with anyone who holds out to him the olive branch, it is said that he is on especially intimate terms with the President, whom he

¹ Since the foregoing was written the President has been presented with "Harbel," a fine sorrel Thoroughbred gelding from Kentucky, and has resumed horseback riding after a lapse of nearly twenty years.

accompanies on walks and whose morning paper he carries to the table when breakfast begins.

The Wilson experience with livestock was more picturesque than fortunate. When the war came on, Mr. Wilson himself conceived the idea of utilizing the big back White House lawn as a grazing place for sheep. He therefore purchased 14 ewes and 4 lambs from a farm near Bel Air, Maryland. Contrary to many statements, these sheep were not purebred. They were grade Hampshires. Later one purebred Shropshire buck from New York and one from California were added, but the ewes in the woolly flock which so many visitors to Washington beheld grazing under the trees about the White House and which popular fancy described as the very *ne plus ultra* of sheep society with pedigrees reaching back to England or Spain, were in fact without ancestral distinction. Unfortunately the White House staff did not include a sheep husbandman, and much of the daily care of the flock fell into the hands of policemen and other like herdsmen who did their best according to their lights. A veterinarian was detailed from the Bureau of Animal Industry who looked after lambing and did his best to rid the flock of parasitic diseases which early appeared. The transfer of the animals from the South lot to the North lot, where the shrubbery was surrounded with chicken wire, was a measure taken to provide the sheep with uninfested ground to graze upon. When Mr. Wilson's sickness came on in the late summer of 1920, the flock, which had increased to more than fifty, was disposed of to several persons.

When Mr. Taft was President it was determined suddenly one day to have a cow, and an official of the Bureau of Animal Industry was commissioned to make the purchase. Before one was found to suit, however, United States Senator Isaac Stephenson of Wisconsin presented Mr. Taft with Pauline Wayne, registered Holstein. This famous cow can not be said to have been entirely happy while she lived at the White House. She gave birth to a bull calf that was named "Big Bill," but he only survived several weeks. After a time, Pauline was sent to augment the purebred Holstein herd at the U. S. Soldiers' Home.

In Mr. Roosevelt's time at the White House, the horse was the animal in favor. The President was himself a famous rider and his favorite was the sorrel "Roswell." Mrs. Roosevelt was

an excellent horsewoman and often rode with her husband. Their daughter, Ethel, also rode with ease and grace. She had presented to her a fine Arabian mare, upon which she frequently accompanied her parents on their rides about the suburbs. Quentin Roosevelt had a pet dog, a black-and-tan, which he dearly loved, and he was heart-broken when the dog disappeared. His mother went with him to the municipal pound on a chance that the dog catcher had gathered in the pet, but, although they could not find him, they took back another small dog that within a few hours would have been chloroformed into dog heaven by the pound master.

Doubtless other Presidents had animal pets at the White House. For instance, it is recalled by old residents that little Tad Lincoln, as a boy of ten years or so, took great pleasure in a pair of goats that he had hitched to a sturdy wagon. Baby McKee in Harrison's time drove a single goat about the grounds and adjacent streets, often accompanied by the President. General Grant had a magnificent trotting horse, and he liked nothing better than to drive him to a light racing buggy, passing most vehicles on the road. Ulyses, Jr., and Jesse Grant drove to school a pair of Shetland ponies hitched to a little wagon. President Arthur and his son Chester A., Jr., were both fond of horses and had many of them. Mr. Arthur sometimes rode along sedately, but liked better to ride behind his four-in-hand bays, almost perfectly matched, and driven by his colored coachman.

A Texas paper advertises for sale "one heifer milk cow." Probably a case of precocious lactation.

After a consultation about a patient in Carlsruhe two medical men disagreed and one shot the other. In our country of course this would be a breach of medical etiquette.—*Punch (London)*.

A traveler in Japan, according to *The Veterinary Record*, tells of an official municipal notice to motorists which reads as follows: "If a cow obstruct, toot 'er soothingly; if she continue to obstruct, toot 'er with vigor; if she still obstruct, wait till she pass away."

THE VETERINARIAN'S FUTURE ¹

By A. T. KINSLEY

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COMPARATIVELY SPEAKING, America is of relatively recent origin and the United States is but a child among nations. According to history, the progress of the various professions in any country has been in a direct ratio to the development of education in that country. A veterinarian is one skilled in veterinary science. Veterinary science "deals with the nature, prevention and treatment of animal diseases, the sanitary housing and care of livestock, and similar matters affecting the health of domestic animals and the healthfulness and wholesomeness of their products."

Probably the first record of a veterinarian or veterinary service occurs in the early history of the Roman Empire and refers particularly to the value of the proper care of the army horse by one familiar with the nature of the various plagues. The horse was recognized as an important factor in the conquests of the Old World, and the necessity of the proper care of these animals was fully appreciated by the warriors. The care of the army horse was originally under the supervision of farriers, who were succeeded in more recent times by the veterinarian.

Simultaneous with the evolution of the caretaker and farrier to the army veterinarian, there was in the agricultural communities a demand and necessity for someone to treat sick and afflicted animals, and thus originated the empiric practitioner. The increase in the numbers of livestock resulted in an increased demand for men skilled in the treatment of afflicted animals, and the most successful animal doctors became preceptors and thus demonstrated their methods to students. Knowledge was slowly accumulated and finally schools and colleges were established.

With the formation of nations, the necessity for the production of sufficient horses and of foods for both their horses and men was recognized as the determining factor in the success in future wars and the maintenance of their nations. The necessity for

¹Presented at meeting of Minnesota State Veterinary Medical Association, St. Paul, January 13 and 14, 1922.

information of the cause, methods of dissemination and control of animal diseases was recognized by the rules and law-making bodies of progressive nations, and thus originated experiment stations and research laboratories. Information obtained in the various experiment stations and research laboratories clearly evidenced the necessity for the control and eradication of animal scourges, and thus originated the veterinary sanitarian.

The desire for information and the exchange of ideas was the prime object that stimulated the formation of veterinary associations, societies and other like bodies, and this is also the explanation of the origin of veterinary journals and periodicals.

Experiment stations and research laboratories demonstrated the value of some biologic agents in the diagnosis and control of certain diseases of animals. In some instances biologic products such as tuberculin and blackleg vaccine are produced in state and government laboratories. However, when the value of such products is established they are as a rule not produced in such laboratories, and the demand for these products was the reason private laboratories have been established.

Thus we have attempted to outline briefly the origin of the veterinarian, and in the discussion various phases of veterinary activity have been indicated. There would appear to be no argument for the necessity for each of the various so-called divisions or groups of the veterinary profession, and he who attempts to make odious comparisons evidences the magnitude of his power of reasoning in his failure of conception of the interdependence of the varied functions of veterinarians and their relationship to the profession as a whole. From the perspective of the livestock industry and the consuming public, each of the various phases of our profession is essential in making the production of livestock a more stable and therefore a more profitable business and in safeguarding the health of the people by efficient inspection of animal products.

The evolution of the veterinarian to the present standard has been the result of the properly directed effort and cooperation of the leaders of our profession, and has been as rapid as could reasonably be expected, and compares favorably with the development of any other profession.

The veterinarian's future will depend almost entirely upon the attitude and relationship that the profession as a whole as-

sumes with the agricultural interests and the conservation of the health of the human, for it is true that the inspection of meat food products and milk is an important function of the veterinarian and his services in this capacity are now fully appreciated by the consuming public.

Educational standard, that is, the requirement in veterinary colleges, is a very important topic in relation to the veterinarian's future. The attendance in veterinary colleges has diminished during the last three years, but this decrease has not been the result of the increased matriculation requirement. Other lures of endeavor have been more attractive, especially financially, than the veterinary profession, due to the low prices of livestock and a temporary oversupply of veterinarians. These conditions are only temporary and will soon be adjusted. The small number of students in veterinary colleges is one of the most favorable indications that veterinary activities are adjusting themselves.

Those engaged in the veterinary profession, whether as teacher, investigator, sanitarian, army officer, practitioner, or producer of commercial veterinary biologics, have an important function. There has been a small per cent of men who were apparently properly prepared who were not successful as veterinarians; but failures in other professions are equally common. Sufficient preparation and adaptability should be the basis for the selection of one's life work.

The reaction during the present reconstruction period has been severe on the veterinary profession, but the same or similar forces that produced the reaction will cause a readjustment, which is already appearing on the horizon, and the future outlook for the veterinarian is attractive. There are many opportunities for veterinarians as teachers, investigators, sanitarians, practitioners, etc.

There is an actual need at the present time of a larger number of efficient instructors in veterinary subjects. Teaching is one of the most important duties in our profession. The young men who have a sufficient education and adaptability should devote themselves to teaching, for the future of our profession will be largely determined by the efficiency of the veterinary college graduates. Other things being equal, the teacher who obtained his training from several different scientists in as many institu-

tions of learning has an advantage over the teacher whose education was completed in a single institution. However, the most successful teacher is not necessarily determined by the number of degrees he may have obtained or the number of foreign colleges and universities attended, but is dependent upon ability to impart correct information and cause his students to acquire knowledge. Teachers of such subjects as surgery, practice, therapeutics, pathology and sanitation are more proficient if a portion of their time is devoted to the application or practice of their specialty.

The opportunities for investigators on veterinary projects are becoming more numerous as a result of requests from the livestock producers who recognize the necessity for the reduction of losses in their flocks. Experiment stations exist in practically every State, and much valuable work has been done. The importance of the livestock industry to general agriculture and therefore to the welfare of our nation was never more fully appreciated than at the present time, and it would seem reasonable to anticipate an increased activity in the investigation of livestock problems. An efficient investigator is one who has the capacity of determining facts that are the deductions of carefully planned and technically executed experiments that have been accurately checked before announcing results. Research work requires a certain amount of routine that may be tedious. The investigator of livestock problems should familiarize himself with the usual conditions and surroundings on farms, and experimental findings should be checked under field conditions. There should be a close cooperation of investigators, sanitarians and practitioners, and the efficient teacher is always alert for proven facts from research laboratories.

The field for veterinary sanitarians is constantly increasing. The activity of the United States Department of Agriculture in the inspection of meat food products and the control of infections and contagious diseases of animals created a demand for veterinary sanitarians, and at the present time several hundred veterinarians are employed in this service. Various States also maintain departments of animal disease control manned by veterinary sanitarians. A large number of municipalities employ veterinarians in their food and dairy inspection departments. Transportation companies, through the Western Weighing and

Inspection Bureau's veterinary corps, are endeavoring to diminish the losses of livestock incidental to shipping. Livestock exchanges are recognizing the importance of disease control, especially of tuberculosis, and are employing veterinarians to assist State and Government officials in this important work.

There has been some criticism of the State and Government sanitary officials' control work because of the infringement upon the duties of the practitioner. In reviewing the governmental and commonwealth activities in animal disease control, it is found that the practitioner had little if any recognition in the eradication of the southern fever tick; but the nature of this problem, coupled with the fact that there were relatively few veterinarians in practice in the rural communities of the tick-infested area, would appear to justify the methods employed. A few years ago hog-cholera control measures were inaugurated by the Bureau of Animal Industry in cooperation with various States, and when successful plans of control had been proven, the practitioner assumed the responsibility. As a result of those cooperative demonstrations the practicing veterinarian has found an increased demand for his services. The more recent campaign of tuberculosis control will in my judgment be one of the most important factors in stabilizing veterinary practice. The annual tuberculin test of fully accredited herds is now being done by the practitioner. There are some accredited-herd owners who are objecting to employing a practitioner to conduct the annual tuberculin test, insisting that the Government and the State established the accredited herds and they should maintain them. Similar objections were made by swine owners when the practitioner was charged with the responsibility of the control of hog cholera, but the value of the local veterinarian is now appreciated by the swine producer and will likewise soon be recognized by the accredited-herd owner. Further, it does not seem probable that public opinion in this country will permit of the Government or State assuming the responsibility of private enterprises such as livestock production.

Technical knowledge, honesty and diplomacy are the prerequisites of a successful sanitarian. The duties of a sanitarian are important and interesting. However, there is frequently little variation, and a continuous routine may become burdensome. The sanitarian is the "go-between" of the livestock owner and

the practitioner, and he who is most successful in control measures cooperates fully with the local veterinarian. In fact, the practitioner is the most important link in the chain that has to do with the control of diseases of livestock.

Army service is attractive to some men. There will be a limited demand in the future for veterinarians for army service, and in times of war there may be extraordinary demands. The recent regulations for reserve officers should be carefully considered by the young men in the veterinary profession.

Commercial enterprises, such as the production of serum, bacterins and other biologics, offer opportunities to a limited number of veterinarians. The necessity for the commercial enterprises is fully appreciated at least by the practitioner and those engaged in the production of livestock. A few veterinarians are engaged in the production and distribution of general veterinary supplies, such as instruments, leather goods, etc. The ethical commercial veterinarian is doing a valuable service, and there are some inducements for competent men in this work.

The veterinary practitioner is the foundation upon which the veterinary profession has been built. According to the available records, about two-thirds of all veterinarians in active professional work are engaged in practice. The field of practice has many advantages over the other lines of veterinary activity. A practitioner conducts his own business and is usually an important citizen of his community. The remuneration of the practitioner is usually considerably more than that of his professional brother who is employed by the Government, State or municipality. The monotony of routine encountered by teachers, investigators and sanitarians is rarely experienced by the practitioner. It is true that the practitioner may be called day or night, but there are few night calls in a properly regulated practice. The practitioner has a definite and permanent home, a convenience not available to some veterinarians engaged in other lines.

Veterinary practice has undergone some radical changes in the last few years. The advent of the automobile substantially diminished equine practice, particularly in cities, and it, combined with better roads, also increased the territory of the practitioner, particularly in the rural districts. The increasing knowledge of feeds and feeding by horse owners and operators

has noticeably decreased the number of cases of indigestion, colic and allied difficulties. For some reason there has apparently been a decrease in the number of cases of operative surgery and dentistry.

The diminished demands in equine practice and surgery have been more than equalized by the increased demands of the practitioner in the prevention and relief of diseases in the meat-producing animals. The practitioner of the future has an almost unlimited field if he will apply himself. Much more valuable service can be rendered in general surgery and equine dentistry than has been done recently. Such cases may have been neglected by the practitioner because more remuneration could be obtained by vaccination of swine and other similar work. The poultry industry is demanding assistance in the prevention of losses in the flocks, and this is an opportunity for the veterinarian to increase his usefulness and to establish more firmly the necessity for a complete veterinary service in every community. If practitioners will assume the responsibility they can be experts in their communities on feeds and feeding problems and on questions of breeding. Unless veterinarians prepare for and assume the responsibility on such problems as feeding, breeding and control of poultry diseases, others less capable will assume this role. There may be a possibility of the development of specialists in the various subjects of the practicing veterinarian's domain, but the livestock industry can not now, and it is problematic whether it ever will, support a specialist to care for each of the various problems that may arise in each community.

The general practitioner who will be an asset to his community should be properly equipped to render an efficient service. That is, he should be capable, adaptable, ethical, respectable, conscientious, and should have sufficient endurance to enable him to withstand the hardships of a general practice. There has been a tendency toward commercialism by a few unethical practitioners. The commercializing of a profession diminishes the standing of that profession, and it is incumbent upon us to conduct our business in an ethical manner and avoid public censure.

A veterinarian either progresses or he retrogresses. Veterinarians progress by comprehensive reading and by association with other veterinarians. Veterinarians who do not read pro-

fessional journals and attend association meetings are retreating and are a discredit to the profession. Every veterinarian in a given State should be an active member of the State veterinary association and the American Veterinary Medical Association.

The influence of the American Veterinary Medical Association upon the future of our profession will depend upon the loyalty of veterinarians to that organization. The past accomplishments, educational and legislative, due to the influence of the American Veterinary Medical Association, are well known. The greater the percentage of eligible veterinarians who are members of the American Veterinary Medical Association, the more representative of our profession that organization becomes. Unity signifies strength. Can a veterinarian do more as a member helping to shape the destiny of the American Veterinary Medical Association and our profession, or as a fault-finding, censuring, condemning outsider? If you are loyal to the profession you should be loyal to your State association and the American Veterinary Medical Association, the organizations that have given our profession its recognition and standing.

The various activities of veterinarians have been briefly discussed. There are about 12,000 veterinarians in the United States engaged in actual professional work. The average professional man continues in active service from 20 to 25 years, and if this is applicable to veterinarians there would be between 400 and 600 retiring from the profession each year. There is now a temporary surplus of veterinarians, but on the other hand there are less than 200 veterinarians graduated from all of the veterinary colleges each year. If the present demand continues—and there are no indications that it will not—the surplus of veterinarians will soon be exhausted and there will be an increased attendance at veterinary colleges.

In conclusion, it is evident, first, that the veterinary profession will survive, because veterinary service alone insures the livestock industry against the ravages of disease and is an indispensable adjunct in the conservation of the health of the nation; second, that the veterinarian's future in the United States with its six and a half billion dollars' worth of farm animals, the constantly increasing demands for efficient milk and meat inspection, the necessity for State and Government control of in-

fectious diseases, the army service and the opportunities in college and research work, should cause little concern provided the various veterinary activities are properly correlated and the services rendered are for the interests of the livestock producer and the consuming public.

COUNTY AGENTS

In scanning the corn belt farm papers these times it is apparent that many county agents are losing their jobs, for in many counties petitions are being circulated asking county courts or commissioners not to re-employ them and in most cases the petitions are based on the plea that in these strenuous financial times the county agent is an unnecessary luxury, while in others the statement is frankly made that these men are not making good. In our opinion, each agent should be judged upon his merits. We have never been able to understand, for instance, why a county agent should not put in the whole winter making schoolhouse addresses on soil fertility, feeding balanced rations, leguminous crops and other vital agricultural subjects—and if he isn't capable of doing this, then he isn't able to earn his salary. From now on farmers are going to vigorously oppose the carrying of "excess baggage." They are going to demand that those who live on the farmers' taxes in whole or in part shall earn their money or get off the payroll—and hence the days of the county agent who is merely trying to "get by" are numbered.—*The Missouri Farmer*.

Prof. John R. McCall, of the Glasgow Veterinary College, in an address before a Glasgow club reviewed the part played by the horse in the great war. At the outbreak of the war, he said, the British army possessed 25,000 horses. In the first 12 days 165,000 horses were impressed into the army service in Great Britain alone. In 1918, there were more than a million horses and mules in the British army. He said that North America furnished the largest contribution to the horse strength of the British army, and that the best type of horse under the severe conditions of warfare in France was the Percheron cross, thousands of which were brought from North America.

ABORTION DISEASE MANIFESTATIONS IN A DAIRY HERD WITHOUT DEMONSTRABLE CAUSE

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FROM WORK already carried out, the writers of this report are strongly of the opinion that the vast majority of cases of abortion disease in California are associated with infection by *Bacillus abortus* Bang. In a small herd under our supervision several abortions and other evidences of abortion disease have occurred and our efforts to detect the presence of infection with *B. abortus* Bang or other specific organism have failed.

The Division of Veterinary Science has maintained on the Berkeley campus for a number of years a small certified dairy. The herd has consisted of from 24 to 26 cows in the milking barn, 5 to 8 dry cows, and 1 bull. In addition, 6 to 8 heifers are raised each year, making a total varying between 45 and 60 head of animals on the premises. The present bull is a purebred Ayrshire, and was added to the herd in August, 1917. He was raised by the breeder from whom we purchased him, was not one year old until September 6, 1917, and probably never was in service until he came to this dairy.

While an effort has been made to keep the dairy supplied with milk cows by raising heifers, it has from time to time been necessary to purchase cows in order to keep the milk supply at the desired level. In 1917, for example, prior to the purchase of the present bull, the previous animal had failed to get the cows properly bred. A number were therefore sold to the butcher and ten outside animals purchased. The trouble at this time was probably due to lack of exercise on the part of the bull. He would not serve cows in œstrum that were turned in with him. On being shipped to the University Farm at Davis, where proper exercise could be given him, he again became a satisfactory breeder. In 1918 no additions were made. In 1919 one first calf heifer was added. In 1920 four animals were purchased. In 1921 to October no additions were made. In all there were 15 cows and one bull added during the period covered by this report, 11 of which animals are still in the

herd. None of the five cows which were sold for slaughter were disposed of on account of breeding difficulties. Two of them reacted to the tuberculin test, two had mammitis, and one was too low in milk production to keep in the dairy.

In the purchase of cows for this dairy care is used to prevent the introduction of tuberculosis, and therefore the animals are usually purchased from small herds close by or from herds the history of which we know something about. Even with these precautions we were not entirely successful in keeping out tuberculosis, as attested by two of the animals later reacting to the tuberculin test. This is the reason for keeping the herd supplied with young stock raised on the premises.

During the years 1917, 1918 and 1919 breeding difficulties of more or less magnitude were encountered, such as an occasional abortion, retained afterbirth, cystic ovaries and delayed oestral periods requiring expression of the corpus luteum. Agglutination tests with *Bacillus abortus* as an antigen made from time to time on individual animals resulted negatively. Fleischer and Meyer in 1916 made examinations of the certified milk sold in the Bay Cities for the presence of tubercle bacilli. This resulted negatively, but they did find *Bacillus abortus* a more or less commonly present organism. From the University Certified Dairy it was found in two of three lots of milk collected January 8, 18, and 22, 1917, respectively. Four guinea-pigs were inoculated with each lot of milk. Two of the four inoculated with the first lot and one of the four inoculated with the second lot showed *Bacillus abortus* infection. The remaining nine experimental animals were negative.

All the cows of milking age in January, 1917, except Nos. 1864 and 1869 in Table 1, had been disposed of by August, 1920, and it was decided at this time to make a systematic search for the presence of this organism in the dairy animals.

On August 25, 1920, blood was drawn from the 24 cows in milk, and on August 30 from the remaining 24 head of dry cows, young stock and bull, making a total of 48 head in the dairy at that time. These samples were tested in four dilutions against three strains of *Bacillus abortus* antigen. The results of this test are given in Table 1. It will be observed that all of the samples gave a totally negative reaction to this test, except the blood from No. 2057. The serum of this animal gave a ++

reaction in 0.04 c.c. and a —+ reaction in 0.02 c.c. against all three antigens.

TABLE 1.—AGGLUTINATION TESTS OF BLOOD SAMPLES FROM ALL THE ANIMALS IN THE DAIRY HERD, AUGUST, 1920.

EAR TAG No.	ANTIGEN 1 PORCINE				ANTIGEN 80 BOVINE				ANTIGEN 104 BOVINE			
	0.04	0.02	0.01	0.005	0.04	0.02	0.01	0.005	0.04	0.02	0.01	0.005
1964	—	—	—	—	—	—	—	—	—	—	—	—
1966	—	—	—	—	—	—	—	—	—	—	—	—
1958	—	—	—	—	—	—	—	—	—	—	—	—
2030	—	—	—	—	—	—	—	—	—	—	—	—
1235	—	—	—	—	—	—	—	—	—	—	—	—
1965	—	—	—	—	—	—	—	—	—	—	—	—
1223	—+	—	—	—	—+	—	—	—	—+	—	—	—
2177	—	—	—	—	—	—	—	—	—	—	—	—
1662	—	—	—	—	—	—	—	—	—	—	—	—
1441	—+	—	—	—	—+	—	—	—	—+	—	—	—
2062	—	—	—	—	—	—	—	—	—	—	—	—
1953	—	—	—	—	—	—	—	—	—	—	—	—
2026	—	—	—	—	—	—	—	—	—	—	—	—
2061	—+	—	—	—	—+	—	—	—	—	—	—	—
1967	—	—	—	—	—	—	—	—	—	—	—	—
2029	—	—	—	—	—	—	—	—	—	—	—	—
1801	—	—	—	—	—	—	—	—	—	—	—	—
2055	—	—	—	—	—	—	—	—	—	—	—	—
1442	—	—	—	—	—	—	—	—	—	—	—	—
2175	—+	—	—	—	—+	—	—	—	—	—	—	—
1960	—	—	—	—	—	—	—	—	—	—	—	—
1957	—+	—	—	—	—+	—	—	—	—+	—	—	—
1864	—	—	—	—	—	—	—	—	—	—	—	—
1663	—	—	—	—	—	—	—	—	—	—	—	—
2155	—	—	—	—	—	—	—	—	—	—	—	—
2171	—	—	—	—	—	—	—	—	—	—	—	—
1968	—	—	—	—	—	—	—	—	—	—	—	—
1869	—	—	—	—	—	—	—	—	—	—	—	—
2170	—	—	—	—	—	—	—	—	—	—	—	—
2057	++	—+	—	—	++	—+	—	—	++	—+	—	—
1438	—	—	—	—	—	—	—	—	—	—	—	—
1445	—	—	—	—	—	—	—	—	—	—	—	—
2143	—	—	—	—	—	—	—	—	—	—	—	—
2142	—	—	—	—	—	—	—	—	—	—	—	—
2027	—	—	—	—	—	—	—	—	—	—	—	—
2181	—	—	—	—	—	—	—	—	—	—	—	—
1969 (Bull)	—	—	—	—	—	—	—	—	—	—	—	—
2178	—	—	—	—	—	—	—	—	—	—	—	—
2179	—	—	—	—	—	—	—	—	—	—	—	—
2180	—	—	—	—	—	—	—	—	—	—	—	—
1435	++	—	—	—	++	—	—	—	++	—	—	—
2060	++	—	—	—	++	—	—	—	++	—	—	—
2063	++	—	—	—	++	—	—	—	++	—	—	—
2144	—	—	—	—	—	—	—	—	—	—	—	—
2173	++	—	—	—	++	—	—	—	++	—	—	—
2154	—	—	—	—	—	—	—	—	—	—	—	—
2183	—	—	—	—	—	—	—	—	—	—	—	—
2182	—	—	—	—	—	—	—	—	—	—	—	—

Explanation of symbols in table:

- Indicates no evidence of reaction.
- + Indicates slight sedimentation but supernatant fluid turbid.
- +— Indicates more sedimentation than —+ but still a faint cloudiness in supernatant fluid.
- ++ Indicates that after overnight incubation complete agglutination is present.
- + Indicates that after overnight incubation there was not complete agglutination, but on standing for 24 hours longer the tube cleared up.

Animal No. 2057 was a heifer, never having had a calf. She was born in the dairy in November, 1917, but not sired by the dairy bull. Her dam was cow No. 2029, purchased when middle aged, just prior to the birth of this calf in November, 1917.

The dam is still in the dairy and has had the following breeding record since purchase:

Gave birth to calf 2057 shortly after arriving at the dairy, November, 1917.

Bred March 20, 1918, and calved normally December 28, 1918.

Bred March 20, April 24 and May 25, 1919. Pregnant to last service and calved normally March 15, 1920.

Bred April 20 and May 10, 1920. Pregnant to last service and calved normally February 21, 1921.

Bred June 2, 1921. Pregnant to this service and at present in milking barn.

Heifer No. 2057 later aborted and will be discussed as Case 2.

CASE 1

Heifer 2154 was the first animal to abort after the general examination of the blood of all the animals given in Table 1. She was born February 15, 1919, and her dam was Cow 1438, which animal has aborted twice and will be discussed as Case 5. At the time blood was drawn this animal was not thought to be pregnant, as she had never been bred by the herd bull. During the spring of 1920, however, there was a history of a stray bull having gotten into the pasture for a few days where this heifer and some other animals were being kept.

On the morning of September 16, 1920, a rider for the water company, whose watershed adjoins our range, saw a heifer in the pasture that had given birth to a premature dead calf, but did not report this until evening. The fetus was seen and covered up with loose dirt by the rider. The forenoon of this same day the dairy foreman noticed Heifer 2154 at the watering trough with tail held out and vulva congested, but did not suspect abortion on account of having no breeding record on the animal. The following day, the water company employee not being available, a search was made of the pasture, but no fetus was found. Coyotes and other predatory animals have been trapped and seen in this pasture and their presence may explain the failure to find the fetus. The animals in the pasture were brought to the barn and upon examination all that were known to be pregnant were still so. On examining No. 2154, although only about 19 months old, the hand could be readily passed into the vagina. The vaginal walls showed some congested areas but the cervix was closed so that one finger could not be inserted into the cervical canal.

The vagina was douched with physiological salt solution, after

which the uterus was examined per rectum and found to be enlarged. By massaging it through the rectum with the other hand in the vagina cupped over the cervix, a small amount of mucus containing flakes of yellowish pus-like material was obtained.

This was placed in a sterile bottle and taken to the laboratory. Two guinea-pigs, Nos. 1731 and 1732, were inoculated intra-abdominally September 18, 1920, with the uterine discharge from this heifer. These experimental animals were chloroformed February 7, 1921, and found to be in a normal condition.

This heifer was bred again December 17, 1920, February 22, 1921, and March 28, 1921, and is now pregnant to the last service.

Agglutination tests made on her blood drawn April 20 and August 20, 1921, resulted negatively.

CASE 2

At the time the blood samples in Table 1 were taken Heifer 2057 was pregnant to a service July 22, 1920. She had previously been bred on at least two occasions, June 10, 1919, and August 10, 1919. From the later date to July 22, 1920, she had been on a hill pasture not exposed to a bull.

On March 27, 1921, while in the pasture, this animal aborted a male fetus due in May from the July service noted above, and the placenta was retained. The animal was brought to the barn and isolated. On March 29, 1921, the membranes were removed manually with little difficulty, the uterus was douched and several ounces of petroleum oil placed in it, following which no further treatment was found necessary.

The fetus was found on the pasture at 4 p. m., March 27, with a few blow-fly larvæ deposited about the nostrils, and was brought to the laboratory at 6:15 p. m. On autopsy it showed sero-sanguineous fluid infiltration of the subcutis especially in the axillary and inguinal regions. The thoracic and abdominal cavities were filled with blood-stained fluid. Some gelatinous masses were present around the heart. The spleen measured 20 by 5 by 2 centimeters and showed several sub-capsular hemorrhagic blotches. The stomach contents were a stringy turbid mass intermixed with gray flakes and blood. The intestines were apparently normal.

Cultures were inoculated the same evening from the tissues and fluids as follows:

Stomach

1. Shake 2 per cent glycerin, 1 per cent glucose-agar bouillon. Discarded May 17, 1921. No growth.
2. Shake 2 per cent glycerin, 1 per cent glucose-agar bouillon plus serum. No change until April 12, 1921, when a cloudiness was observed on the surface. Subculture and microscopic examination failed to reveal any organism; probably a precipitation of the serum.
3. Cooked blood agar slant. Discarded May 17, 1921. No growth.
4. Cooked blood agar slant. Discarded May 17, 1921. No growth.
5. Cooked blood agar slant in CO₂ chamber.¹ Discarded May 17, 1921. No growth.
6. Cooked blood agar slant in CO₂ chamber. Discarded May 17, 1921. No growth.
7. Cooked blood agar plate in CO₂. Seven colonies; 5 varieties developed. April 2, 1921. All discarded April 12, 1921.
8. Cooked blood agar plate in CO₂ chamber. Many contaminations. May 4, 1921. Discarded April 12, 1921.

Liver

1. Shake 2 per cent glycerin, 1 per cent glucose-agar bouillon. Discarded May 12, 1921. No growth.
2. Shake 2 per cent glycerin, 1 per cent glucose-agar bouillon plus serum. Cloudiness developed as in same culture from the stomach. Subcultured as above. No growth.
3. Cooked blood agar. Discarded May 17, 1921. No growth.
4. Cooked blood agar slant in CO₂ chamber. Discarded May 17, 1921. No growth.
5. Cooked blood agar plate in CO₂ chamber. Overgrown with contaminating colonies and discarded, April 12, 1921.

Spleen

1. Shake 2 per cent glycerin, 1 per cent glucose-agar bouillon. Discarded May 17, 1921. No growth.
2. Shake 2 per cent glycerin, 1 per cent glucose-agar bouillon plus serum. Discarded May 17, 1921. No growth.
3. Cooked blood agar slant. Discarded May 17, 1921. No growth.
4. Cooked blood agar slant in CO₂ chamber. Discarded May 17, 1921. No growth.

Intestines (Colon)

1. Shake 2 per cent glycerin, 1 per cent glucose-agar bouillon. Discarded May 17, 1921. No growth.
2. Shake 2 per cent glycerin, 1 per cent glucose-agar bouillon. Discarded May 17, 1921. No growth.
3. Cooked blood agar, CO₂ chamber. Discarded May 17, 1921. No growth.
4. Two per cent glycerin, 1 per cent glucose-agar slant. Discarded May 17, 1921. No growth.
- 5 and 6. Two per cent glycerin, 1 per cent glucose-agar slant and liver agar in CO₂ chamber. Discarded May 17, 1921. No growth.

All of the above-mentioned cultures except those placed in the CO₂ chamber were sealed with sealing wax as suggested by Theobald Smith. Smears were made from the stomach,

¹ Huddleson. Cornell Veterinarian. 1921, vol. 11, pp. 210-215.

liver, spleen and intestinal contents and examined in stained and unstained preparations, but no vibrios or other definite microorganisms could be seen.

Five guinea-pigs (three male and two female) were inoculated March 29, 1921, with the tissues of this abort, and one male guinea-pig with colostrum from the udder of the dam, as follows:

Guinea-pig 1778 intraabdominally with intestinal content.
Guinea-pig 1779 intraabdominally with intestinal content.
Guinea-pig 1780 intraabdominally with stomach content.
Guinea-pig 1781 intraabdominally with stomach content.
Guinea-pig 1782 intraabdominally with liver and spleen emulsion.
Guinea-pig 1783 intraabdominally with colostrum from dam.

These animals were bled April 11, 1921, and the blood gave a negative agglutination test to *Bacillus abortus* of both bovine and porcine origin. Guinea-pig 1780 was in a moribund condition April 19, 1921, and was bled and killed. The blood gave a negative agglutination test. Postmortem showed many small grayish specks on liver. Lungs contained several small solidified areas. Cultures from liver, spleen and lungs, kept under observation until July 18, 1921, showed no growth excepting that one shake culture developed a surface growth of a Gram-positive coccus.

The blood of all guinea-pigs used in this work except Nos. 1731 and 1732 in Case 1 and Nos. 1829 and 1830 in Case 4 was tested for the presence of *Bacillus abortus* agglutinins before inoculation and found negative. This bleeding was done from the ear vein,¹ one-half mil of blood being collected in 4½ mils of carbolized sodium citrate saline solution.

The remaining five guinea-pigs were bled and killed July 11, 1921. Their blood gave a negative agglutination test.

Postmortem notes on these animals were as follows:

No. 1778, no lesions found.
No. 1779, no lesions found.
No. 1781, no lesions found.
No. 1782, no lesions found.
No 1783, no lesions found; carcass emaciated.

April 27, 1921, the genital tract of this cow was examined and found to be normal. Agglutination tests, as shown in Table 2, were made on blood drawn from this animal, in addition to those given in Table 1.

¹ Seddon. Jour. Comp. Path. and Ther., 1915, vol. 28, p. 25.

TABLE 2.—ABORTION AGGLUTINATION TESTS, COW 2057.

ANTIGEN	MAR. 27, 1921	APR. 18, 1921	APR. 23, 1921	MAY 23, 1921
No. 1 (Porcine)				
0.04	++	++	+-	+-
0.02	++	+	-	-
0.01	-	-	-	-
0.005	-	-	-	-
B-104 (Bovine)				
0.04	++			
0.02	++			
0.01	-			
0.005	-			
No. 3 (Porcine)				
0.04	+			
0.02	-			
0.01	-			
0.005	-			
No. 2 (Porcine)				
0.04	++	++		
0.02	+-	+-		
0.01	-	-		
0.005	-	-		
B. A. (Bovine)				
0.04	++	++		
0.02	+-	+-		
0.01	-	-		
0.005	-	-		
No. 4 (Bovine)				
0.04	++			
0.02	++			
0.01	-			
0.005	-			
No. 80 (Bovine)				
0.04				+
0.02				-
0.01				-
0.005				-

A sample of milk was taken from her May 6, 1921, and inoculated into guinea-pigs. This sample consisted of first milk and strippings in approximately equal amounts, total about one quart of the evening milking. Six hundred mls of this were centrifuged and the sediment inoculated intra-abdominally into Guinea-pigs 1795 and 1796 on May 8, 1921. These guinea-pigs were bled July 14, 1921, and again at the time of slaughter, August 30, 1921, and the blood gave a negative agglutination test to *Bacillus abortus* of both porcine and bovine origin. Post-mortem examination was negative except for some adhesions from peritonitis in Guinea-pig 1795. Cultures made from the spleens of the animals on blood-agar remained sterile.

This cow was sold to the butcher and slaughtered on May 26, 1921, on account of the fact that she was the only animal in the herd giving any semblance of what might be termed an agglutination reaction to *Bacillus abortus* antigen. Milk was

again taken from her just prior to slaughter and inoculated into Guinea-pigs 1817 and 1818 in the same manner as the sample taken May 6, 1921, with negative results.

Two guinea-pigs, Nos. 1819 and 1920, were inoculated intra-abdominally May 28, 1921, with scrapings from her uterine mucous membrane and supramammary lymph glands. These guinea-pigs were bled June 25, 1921, and again on July 14, 1921, and the blood was tested against *Bacillus abortus* antigens of bovine and porcine origin, with negative results. They were bled and killed August 30, 1921. Postmortem examinations showed them to be normal. Agglutination tests made on their blood were negative. Cultures made on blood-agar from their spleens remained sterile.

CASE No. 3

Cow 2301 was raised at the dairy and had calved normally April 18, 1918, June 15, 1919, and April 30, 1920.

Following the last parturition she was bred June 28, 1920, and became pregnant to the service. She was, therefore, 2 months pregnant when the blood samples in Table 1 were taken. On March 30, 1921, this cow delivered dead twins conceived 275 days previously on June 28, 1920. This pregnancy, therefore, terminated a few days prematurely, which may be accounted for by the fact that there were twins.

The fetuses were male and female and the tissues and organs in both were apparently normal. The membranes of each fetus appeared normal, only one small necrotic area being observed in one fetal cotyledon.

The fetuses were taken to the laboratory for further examination. From the stomach and lungs respectively of each fetus the following cultures were made:

Cooked blood-agar	} Sealed and incubated
2 per cent glycerin, 1 per cent glucose shake agar	
Gentian violet fetus medium	
Cooked blood-agar	} Placed in 10 per cent CO ₂ chamber and incubated
2 per cent glycerin, 1 per cent glucose agar slant	
Gentian violet fetus medium	
Cooked blood-agar plate	

Smears were made from the stomach and lungs of both the fetuses and examined in stained and unstained preparation. No definite organisms could be found in them.

All the cultures from the male fetus remained sterile, as well as those from the stomach of the female fetus. The cooked blood-agar plate and the fetus medium from the lung of the female fetus under CO_2 showed a few colonies of contaminating organisms (*Bacillus subtilis*) of no significance. All the cultures were discarded May 17, 1921.

On March 31, 1921, guinea-pigs were inoculated intra-abdominally with tissues of the fetuses as follows:

Guinea-pig 1784. Placenta of both fetuses, including a portion of the necrotic area mentioned above.

Guinea-pig 1785. Stomach contents of both fetuses.

Guinea-pig 1786. Lungs of both fetuses.

Guinea-pigs 1784 and 1786 were bled and killed July 2, 1921. Postmortem examination of No. 1784 showed an abscess on the greater curvature of the stomach from which a streptococcus was isolated. Guinea-pig 1785 was bled and killed July 13, 1921. Postmortems of this animal and of No. 1786 were negative. Agglutination tests made on the blood of all three animals were negative.

EXAMINATIONS OF MILK SAMPLES FROM THE HERD

On May 25, 1921, milk samples were taken from all the cows in the dairy giving milk at the time and composite samples were injected into guinea-pigs. The samples were collected as shown below, and two guinea-pigs were inoculated with each sample, making a total of twenty experimental animals.

MILK SAMPLES FROM U. C. DAIRY ANIMALS

(Taken from evening milking May 25, 1921. At least 600 c.c. samples centrifuged May 26 and sediment inoculated intra-abdominally into guinea-pigs May 27, 1921.)

Sample 1. Composite of first milk and strippings in approximately equal amounts total about one quart from Cows 2027, 2178, 2299, 1869 and 1662, inoculated into Guinea-pigs 1797 and 1798.

Sample 2. Ditto from Cows 1968, 2055, 2063, 1960 and 1967, inoculated into Guinea-pigs 1799 and 1800.

Sample 3. Ditto from Cows 2029, 2301, 1864, 1435 and 1965, inoculated into Guinea-pigs 1801 and 1802.

Sample 4. Ditto from Cows 1438, 2298, 2300, 2030 and 2026, inoculated into Guinea-pigs 1803 and 1804.

Sample 5. Ditto from Cows 1223, 2060, 2296, 2177 and 2061, inoculated into Guinea-pigs 1807 and 1808.

Sample A. From vat after milking of Cows 2027, 2178, 2299, 1869, 1662, 1868 and 2063, inoculated intra-abdominally Guinea-pigs 1809 and 1810.

Sample B. From vat after milking Cows 2055, 1967, 2029, 2301, 1864, 1960 and 1435, inoculated intra-abdominally Guinea-pigs 1811 and 1812.

Sample C. From vat after milking of Cows 1438, 1965, 2298, 2300,

2030, 2026 and 1223, inoculated intra-abdominally Guinea-pigs 1813 and 1814.

Sample D. From vat after milking of Cows 2296, 2060, 2177, 2061, 2142, 1957 and 1953, inoculated intra-abdominally Guinea-pigs 1815 and 1816.

Six of these Guinea-pigs, Nos. 1799, 1801, 1802, 1805, 1810 and 1816, died of intercurrent disease. Blood was obtained from No. 1805 June 16, from No. 1802 June 23, and from No. 1801 June 25, all of which gave negative agglutination tests. The remaining 14 were bled June 25, July 14, and before slaughter August 27 and 30, respectively. Agglutination tests made on these blood samples against *Bacillus abortus* antigens of bovine and porcine origin all resulted negatively.

Postmortem notes on these animals were as follows:

POSTMORTEM NOTES ON INOCULATED GUINEA-PIGS

Guinea-pig 1797.	Condition good; no lesions.	Cultured spleen on cooked blood-agar.
Guinea-pig 1798.	Condition good; no lesions.	Cultured spleen on cooked blood-agar.
Guinea-pig 1800.	Condition good; no lesions.	Cultured spleen on cooked blood-agar.
Guinea-pig 1803.	Condition good; no lesions.	Cultured spleen on cooked blood-agar.
Guinea-pig 1804.	Condition good; no lesions.	Cultured spleen on cooked blood-agar.
Guinea-pig 1806.	Condition good; no lesions.	Cultured spleen on cooked blood-agar.
Guinea-pig 1807.	Condition good; no lesions.	Cultured spleen on cooked blood-agar.
Guinea-pig 1808.	Condition good; no lesions.	Cultured spleen on cooked blood-agar.
Guinea-pig 1809.	Condition good; no lesions.	Cultured spleen on cooked blood-agar.
Guinea-pig 1811.	Condition good; slight adhesions between left lung and pleura.	Cultured spleen on cooked blood-agar.
Guinea-pig 1812.	Condition good; no lesions.	Cultured spleen on cooked blood-agar.
Guinea-pig 1813.	Condition good; left lung showed adhesions and an abscess.	Cultured spleen and lung on cooked blood-agar.
Guinea-pig 1814.	Condition good; no lesions.	Cultured spleen on cooked blood-agar.
Guinea-pig 1815.	Condition good; no lesions.	Cultured spleen on cooked blood-agar.

All of the cultures made from the spleens and incubated under 10 per cent CO₂ pressure remained sterile and were discarded September 23, 1921. The culture made from the abscess in the lung of Guinea-pig 1813 showed a growth after two days of a bipolar organism not considered significant.

CASE 4

Cow 1662 was raised at the dairy. First calf born normally August 16, 1918. Second calf born normally September 23, 1919. Third calf born July 13, 1920. At this parturition the afterbirth was retained and had to be treated and manually removed. The uterus was examined and found to be apparently normal August 28, 1920. This cow was bred October 20 and November 10, 1920, and March 1, 1921, becoming pregnant to the last service. Her blood was examined as shown in Table 1 and again April 26, 1921, and gave negative agglutination tests. The animal was examined and found pregnant July 9. In this examination one hand was placed in the rectum and the other in the vagina. The hand in the vagina clasped the cervix, fixed it and exerted some traction posteriorly.

On the morning of July 29, five months after conception and twenty days following examination, this cow, when brought into the barn, had fetal membranes protruding from the vagina, but a search of the corral failed to reveal the expelled fetus, probably for the same reason as that mentioned in Case 1. At 4 p. m. this day the cow was examined and the fetal membranes removed. The fetal cotyledons were quite yellow in appearance. The chorion had a light pink color, but on close examination this color was streaked with yellow. In three areas about four inches in diameter the capillary congestion was very marked, being unevenly distributed so that the membrane appeared mottled with reddish spots about the size of a pea. The membranes appeared perfectly fresh with no odor or evidence of decomposition.

Two guinea-pigs, Nos. 1829 and 1830, were inoculated with 1 c.c. each of an emulsion obtained by grinding small pieces of tissue from the cotyledons and membranes with the gelatinous material in the membranes and a small amount of sterile physiological salt solution.

Blood was taken from these guinea-pigs by bleeding from the ear August 20, 1921, and the agglutination test with *Bacillus abortus* antigens of bovine and porcine origin was applied to it, with negative results.

The guinea-pigs were bled again and killed November 10, 1921. Both were normal on postmortem examination, although

No. 1830 was in poor condition. Agglutination tests made on the blood were negative. Cultures were made on blood-agar plates from the spleen of 1829 and from the spleen and testicle of 1830 and incubated under 10 per cent CO_2 pressure in a glass jar.

The blood-agar plates were examined at the end of four days' incubation in the CO_2 chamber and showed only a few contaminating colonies. The plate from the testicle of No. 1830 showed only one colony and it was not on the streaked area. These plates were kept in the incubator not under CO_2 for three days longer and were discarded November 22, 1921, having shown no significant organisms.

CASE 5

Cow 1438, the dam of No. 2154, Case 1, was born in the dairy in 1914. Her first calf was born normally in January or February, 1917. Second calf born normally January 28, 1918. Third calf born normally February 15, 1919.

Following this parturition she was bred again in May or June, 1919, the exact date not being recorded.

December 17, 1919, she aborted twins at about 7 months' gestation, and the afterbirths were retained, requiring treatment and manual removal.

She was bred again on February 14, 1920, and became pregnant to this service. The agglutination test shown in Table 1 on her blood was negative. She calved normally November 10, 1920. This is an unusually good milk cow and she was not bred again until April 4, 1921, to which service she conceived.

A second agglutination test was made on blood taken from the animal April 26, 1921, with negative results. This animal was examined for pregnancy by the bimanual method, as in Case 4, September 15, 1921, and found to be pregnant.

During the night of Sunday, September 25, she aborted the fetus conceived April 4 and had retained afterbirth which had to be treated and manually removed September 28, 1921.

The fetus was brought to the laboratory on the morning of September 26, 1921, and cultures were made from the stomach, lung and thoracic fluid as follows:

- Three glycerin-agar shake cultures.
- Three glycerin-agar slant cultures.
- Two cooked blood-agar slant cultures.
- Three glycerin-agar plate cultures.
- One blood-agar plate.

All the cultures were incubated under 10 per cent CO₂ pressure. Smears and hanging drop preparations made from the fresh material did not show any definite organisms. The cultures remained sterile with the exception of two large white colonies on one plate culture and one on another, which were clearly of no significance. The cultures were discarded October 12, 1921, by which time molds had developed on the plates, but nothing in the tubes.

Two guinea-pigs, Nos. 1843 and 1844, were inoculated with stomach contents, thoracic fluid and lung of the fetus September 21, 1921. Blood taken from these guinea-pigs November 16, 1921, gave a negative agglutination reaction with *Bacillus abortus*. They were bled and killed December 8, 1921, and found to be in good condition and normal. Their blood failed to react to *Bacillus abortus* antigen. Cultures were made from the spleens on cooked blood-agar and glycerin-agar and incubated under 10 per cent CO₂ pressure until December 19, 1921, but remained sterile and were discarded.

OTHER CASES SHOWING BREEDING DIFFICULTIES

In addition to the cases reported above, Cow 1869 had a retained afterbirth in 1919 and Cows 1960 and 1965 had retained afterbirths in 1920. Cow 1953 had the same trouble in 1921. This latter animal was treated in 1919 for cysts in her ovaries and retained corpus luteum. Following her first calf, June 29, 1918, she did not come in heat until after treatment on March 12, 1919. She was then bred March 15, April 26 and May 28, 1919, becoming pregnant to the last service. She was born in 1914 and considerable difficulty was experienced in getting her pregnant the first time.

Following the conception of May 28, 1919, she calved normally March 12, 1920. She was bred again August 25, 1920, to which service she conceived and delivered twins April 18, 1921. At this parturition one of the fetal membranes was retained and had to be manually removed forty-eight hours afterwards. Little difficulty was experienced in removing the membranes, but considerable discharge from the uterus was observed April 27. She was treated April 29 and 30 with warm uterine injections of physiological salt solution followed by 1 per cent Lugol's solution, after which the discharge ceased.

FEEDING OF THE HERD

The milking cows in this herd are fed dry feed during about nine months of the year, from about June 15 to March 15. During the remaining three months, which constitute our green feed season, they are allowed to run on hillside pasture, getting practically all their feed in this way. The dry feed consists entirely of alfalfa hay as a roughage, with a somewhat varying mixture of concentrates. Beet pulp and coconut meal have been regularly fed. During most of the period covered by this report bran has been used as a third concentrate, but at times this has been replaced with rolled barley. The dry cows and young stock are kept on pasture during all of the year, it being sometimes necessary during the winter to feed them a small amount of hay. The bull is kept penned up during most of the time and fed dry feed. During the green-feed season he is usually given a few weeks on pasture.

SUMMARY AND DISCUSSION

In considering these cases, No. 1 is interesting from the fact that her dam has aborted twice. The possibility of the bovine uterus in some animals being inherently hypersensitive to overdistention to the point that expulsive contractions take place at certain stages of gestation, resulting in premature expulsion of the offspring, as has been observed in the human family, should not be overlooked.

Case 2 attracted attention at the time of the general examination of the blood of all the animals in August, 1920. While her blood serum gave an agglutination reaction to *Bacillus abortus* higher than any of the animals in the herd, it still never reached the point where it could be considered positive. Its agglutinating properties increased somewhat between August 30, 1920, and March 27, 1921, in that the — + reaction in 0.02 dilution of the former date reached a ++ in the same dilution on the latter date. Especial significance was given to this on account of the fact that she aborted on the latter date. The history of the animal does not reveal exposure to *Bacillus abortus* infection, and the large amount of work done on her fails to incriminate *Bacillus abortus* or any other infection.

Case 3 is of least significance on account of the fact that

there were twins and birth was so nearly at term. Death of both fetuses may have occurred during the parturition, as no attendant was present, and there may have been posterior presentations, or mechanical obstruction of the umbilical vessels may have occurred.

Cases 4 and 5 aborted twenty and ten days respectively after a bimanual manipulation of the genital organs in the diagnosis of pregnancy. These two cases, together with other circumstantial evidence which has come to our notice, lead us to venture the suggestion that such examination may, under certain conditions at present unrecognized, be responsible for abortion. It is the vaginal portion of the examination on which we place the responsibility if any can be placed on this procedure. Its value in the diagnosis of pregnancy in some cattle is so great that it can not well be dispensed with, but if it is a possible cause of abortion, it will have to be done with more care than is at present exercised when the opinion is so generally held that there is no danger of examination causing this phenomenon.

All the cases described in this paper occurred between September 16, 1920, and September 25, 1921, a period of about one year. If we exclude Case 3 as being doubtful, there still remain four definite cases of abortion in one year among about forty animals of breeding age. This is, therefore, 10 per cent of premature expulsions of the offspring in this herd without demonstrable cause. In addition we have had several retained afterbirths, failure to conceive, retained yellow body, etc., which conditions are frequently grouped under the manifestations of abortion disease. These animals will form a portion of a large group of animals which are to be utilized in abortion disease studies during the next five years, therefore rendering important a knowledge of their present status in regard to breeding difficulties.

What the Cow Gave

Want Ad in the Wichita Falls *Times*: "For Sale—A full blooded cow, giving milk, three tons of hay, a lot of chickens, and several stoves."

THE EFFICIENCY OF CARBON TETRACHLORID AGAINST HOOKWORMS IN THE SILVER BLACK FOX

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IN A PREVIOUS COMMUNICATION (1) the economic importance of hookworm infestation in silver black foxes in captivity was outlined and the results obtained in experiments with chloroform and thymol were reported.

In the meager literature on parasitic diseases of foxes there is little recorded as to the prevalence of hookworms. Riley and Fitch (3) state that from the results of the examination of the feces of foxes from a number of farms and the reports in the literature they are led to believe that hookworm infestation is quite common. These writers have observed the presence of *Uncinaria polaris* in three out of four silver fox ranches examined, and state that this parasite was responsible for the death of young stock, and that the quality of the fur of infested animals was affected.

When writing our previous paper the information as to the prevalence of hookworms in the ranch fox was incomplete, and since then we have encouraged the ranchers in the vicinity to furnish us with carcasses of animals that die and to submit samples of feces from suspected foxes. In addition a large number of samples of feces have been taken for examination from foxes being exported from Canada.

In all 1,422 specimens have been examined, and 345, or approximately 24 per cent, showed the presence of hookworms. In some ranches the percentage of infestation was found to be as high as 65, and only a comparatively few ranches were absolutely free from infestation. In a number of cases hookworm eggs were demonstrable in excellent, full-furred foxes.

EXPERIMENTS WITH CARBON TETRACHLORID

In his experiments with carbon tetrachlorid on dogs, Hall (2) found that this drug administered in capsules in a dose rate of 0.3 mil per kilo removed 34 or all of the hookworms present

in nine experimental dogs. This worker employed smaller dosage in other experiments, but concluded that 0.3 mil per kilo was necessary to obtain the maximum efficiency.

Hall's report was published in April, when accurate experimentation with foxes is impossible because of the difficulty of securing experimental animals. The work had to be held over until the pelting season. It was not known just what effect carbon tetrachlorid would have on foxes, but in the meantime its use was suggested, and it was used with variable results by a number of fox ranchers. In a number of instances the dosage employed was too small for efficient results.

In our present series of experiments we followed the technique as outlined in our previous paper. The drug was given in gelatin capsules, and followed with a small quantity of castor oil to hasten swallowing. The animals were fasted for from 12 to 14 hours before giving the drug.

EXPERIMENT 1

In order to avoid eliminative work it was decided to begin our experiments with the dosage found by Hall to be efficacious in dogs, namely, 0.3 mil per kilo (approximately 5 minims for each 2.2 pounds of body weight).

Fox No. 249 passed 24 hookworms (20 of which were passed in the first stool) and 3 ascarids. When killed seven days later some petechiæ were found in the lower bowel; other organs were apparently healthy. One hookworm was found on postmortem. This animal was malformed, being nearly as broad as long. Efficiency against ascarids, 100 per cent; against hookworms, 96 per cent.

Fox No. 250 passed no worms; none found on postmortem. Organs apparently normal.

Fox No. 251, same as No. 250.

Fox No. 252, same as No. 250.

Fox No. 253 passed 25 hookworms, and none were found when the animal was killed six days later. Hookworm eggs were seen in the feces for several days after treatment. Organs normal. Efficiency against hookworms, 100 per cent.

Fox No. 255 passed one hookworm and one ascarid. Organs found normal and no worms when fox was killed seven days

later. Efficiency against hookworms, 100 per cent; against ascarids, 100 per cent.

Fox No. 256 passed 3 hookworms in first stool; no worms found when killed five days later. Organs in good condition. Efficiency against hookworms, 100 per cent.

Fox No. 257 was found to be free from intestinal parasites; all tissue apparently healthy.

Fox No. 259 passed two hookworms. No worms were found on postmortem when held ten days later. Efficiency against hookworms, 100 per cent.

Fox No. 260 passed no worms, but had 2 hookworms and 3 ascarids when killed five days after treatment. Efficiency against ascarids and hookworms, 0 per cent.

Fox No. 261 passed one hookworm; none found on postmortem four days later. Organs normal. Efficiency against hookworms, 100 per cent.

Fox No. 262. No worms passed; none found on postmortem. Organs normal.

Fox No. 263 passed no worms; none were found on postmortem. Animal became constipated; bowels made to move with difficulty.

Fox No. 264 passed 6 hookworms and 4 ascarids. Animal died on eighth day. No worms were found. Animal lost one and one-half pounds in weight from time of dosing until death. Animal was underweight and anemic when treated. Efficiency against hookworms and ascarids, 100 per cent.

Fox No. 265 passed 1 hookworm; none were found on postmortem. Efficiency against hookworms, 100 per cent.

Fox No. 266 passed no worms; none were found on postmortem five days later. This animal became intoxicated and paralyzed before being released after treatment. Artificial respiration employed and animal recovered.

Fox No. 267 passed 3 hookworms; none found when animal was killed ten days later. Organs apparently healthy. Efficiency against hookworms, 100 per cent.

Fox No. 268. Samples of first stool thrown out by mistake. No worms on postmortem. No conclusion.

Fox No. 269 passed 1 ascarid; none found on postmortem eight days later. Efficiency against ascarids, 100 per cent.

Foxes Nos. 270 and 271 were found to be free from worms. Organs apparently normal.

Fox No. 272 passed 12 hookworms, and had retained 3 hookworms when killed seven days later. Efficiency against hookworms, 80 per cent.

Fox No. 273 passed 1 hookworm; none found on postmortem ten days later. Efficiency 100 per cent.

Fox No. 274 passed 1 ascarid. Efficiency against ascarids, 100 per cent.

EXPERIMENT 2

In the second experiment, double the quantity (0.6 mil per kilo) of carbon tetrachlorid was administered in capsules to four foxes.

Fox No. 275 passed 4 hookworms and retained none, giving an efficiency of 100 per cent. No toxic effects were noted, and the organs were apparently normal on postmortem eight days later. Transitory intoxication; recovered.

Fox No. 276, weighing 6 kilos, was given 3.6 mils of carbon tetrachlorid. There were no immediate or after effects, and the organs were apparently normal when the animal was killed eight days after treatment. No worms present.

Fox No. 277 was free from intestinal parasites. Organs normal.

Fox No. 278 passed 123 hookworms, 122 of which were voided during the first day after treatment, and 6 ascarids. This animal was stunted and weighed only 3.5 kilos. When killed one



Fox No. 278. One hundred and twenty-three hookworms were removed from this stunted and malformed fox during the first day after treatment with carbon tetrachlorid. Only 8 hookworms remained

month later no lesions that could be attributed to the drug were observed. Eight hookworms found on postmortem. Efficiency against ascarids, 100 per cent; against hookworms, 93.5 per cent.

EXPERIMENT 3

In the third experiment two foxes received the carbon tetrachlorid in drench. The animals were fasted as in the previous experiments and no purgative was given either before or after the drug.

Fox No. 279 was given carbon tetrachlorid on the basis of 0.3 mil per kilo. This animal collapsed inside of a few seconds, later became greatly excited, and recovered in half an hour. One hookworm was recovered from the feces, and none were found on postmortem. Efficiency 100 per cent.

Fox No. 280 was given carbon tetrachlorid on the basis of 0.6 mil per kilo of body weight. Animal became sick immediately. Staggered around pen, but recovered in ten minutes. One ascarid was passed and no worms retained. Efficiency against ascarids, 100 per cent.

DISCUSSION OF RESULTS OBTAINED IN THESE EXPERIMENTS

In all, 23 experimental foxes were given carbon tetrachlorid in capsules at the rate of 0.3 mil per kilo of body weight, and 13 of these were found to harbor hookworms in numbers varying from 1 to 25. The total number of hookworms present in these 13 animals was 85, and the treatment expelled them all but 6. An efficiency of 100 per cent was obtained in 10 out of 13 cases. Combining the results obtained in all cases, an efficiency of 93 per cent was obtained, which is a much higher index than that obtained with any other substance yet used against hookworms in foxes.

In Experiment 2 a remarkable efficiency is shown for carbon tetrachlorid in the case of fox No. 278. Only 8 hookworms remained after treatment, and 122 worms were removed the first day.

This experiment also indicates that double the effective dose as determined in Experiment 1 may be given without producing any apparent injury to the animal, provided the carbon tetrachlorid is carefully administered in capsules. If given in

drench, as in Experiment 3, distressing symptoms may be produced.

The chief danger lies in the difficulty of administering capsules to adult foxes. In their struggle to resist medication, the capsules are frequently damaged by the teeth, and some of the escaping drug may readily reach the trachea. Once carbon tetrachlorid, given in doses mentioned above, reaches the stomach, there seems to be little danger from absorption.

Fox No. 264 died four days after the administration of the drug, but this animal was unthrifty and emaciated when admitted to the experiment. In some few cases constipation was produced, but this did not occur with sufficient regularity to cause much annoyance.

In addition to the experiments recorded in this paper, 399 adult foxes were treated, under our supervision, by fox ranchers. The dose given was 20 minims, which approximates the average quantity of carbon tetrachlorid used in Experiment 1. The feces were not examined, and no conclusions can be drawn as to efficacy of the treatment; but only seven deaths were reported as a result of the treatment.

Although the number of ascarids present in the experimental animals was small, the indications are that carbon tetrachlorid has also a high index against them. This is in agreement with Hall's findings in the case of dogs.

COMPARISON OF CARBON TETRACHLORID WITH CHLOROFORM AND THYMOL

Chloroform.—In our previous experiments with other anthelmintics it was found that chloroform was inefficient, removing only 21 per cent of the hookworms harbored by 14 experimental foxes. Fifty per cent of these animals died as a result of the treatment.

Thymol.—This drug showed a high degree of efficiency (87.8 per cent) when given to foxes on the basis of 0.13 gram per kilo of body weight, with this dose repeated in two hours. From this dosage a mortality of 18.7 per cent followed, making its use prohibitive except during pelting time when the skins of the animals are marketable. When thymol was used on the basis of 0.065 gram per kilo of live weight and the dose repeated in two hours, an efficiency of 33 per cent was obtained, and

the mortality was reduced to about 6.8 per cent. One dose of 0.065 gram of thymol per kilo of live weight had little or no anthelmintic effect.

SUMMARY

1. When given to foxes at the rate of 0.3 mil per kilo of body weight (5 minims for each 2.2 pounds), carbon tetrachlorid showed an efficiency of 93 per cent against hookworms.

2. Only one death occurred among the experimental animals. This death was attributed to the poor condition of the animal.

3. When foxes are overcome by carbon tetrachlorid as a result of the capsule being broken while being forced into the pharynx, a number of these animals can be revived by artificial respiration.

4. Only 7 died out of a total of 399 foxes treated with 20 minims of carbon tetrachlorid.

5. Carbon tetrachlorid is more efficient and much less dangerous than either chloroform or thymol.

6. The indications are that carbon tetrachlorid is also efficient when used against ascarids in the silver black fox.

ACKNOWLEDGMENTS

My thanks are due to the fox ranchers of Prince Edward Island, who kindly furnished me with foxes for these experiments, and also to Dr. F. Torrance, Veterinary Directory General, Ottawa, and to Dr. E. A. Watson, Chief Animal Pathologist, Ottawa, for permission to publish this article.

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The British Ministry of Agriculture and Fisheries, as a means of helping young veterinary graduates to obtain facilities for further study and research work, has awarded two veterinary research scholarships of the value of 200 pounds sterling per annum.

PROPHYLACTIC VACCINATION OF DOGS AGAINST RABIES

By A. EICHHORN and B. M. LYON

Pearl River, New York

VACCINATION against rabies is one of the oldest methods of immunization practiced. Due to the magnificent work of Pasteur on the immunization against rabies, it is possible to avert the disease even after exposure. Hundreds of thousands of patients have been successfully protected by this form of vaccination, and even today it is considered the most suitable method for the prevention of the disease in man.

The Pasteur vaccine is prepared by drying the spinal cord of a rabbit artificially infected with the fixed virus of rabies over potassium hydrate for various lengths of time. Drying of the cord attenuates the virus to a certain degree and makes possible its injection into the exposed individuals with impunity.

In the Hogenes method the attenuation of the fixed virus is eliminated. The method consists in grinding the brain of a rabbit artificially inoculated with fixed virus and injecting varying dilutions of this ground brain. Aside from a protective serum, which has also been successfully prepared, although found to be of no advantage over the other vaccines, all other methods of vaccination which have been developed and recommended are based on the same principle as the Pasteur and Hogenes method; that is, the foundation of all the vaccinations is the inoculation of the patients with the fixed virus.

The term "fixed virus" designates rabies virus which by repeated and continuous passages through rabbits has become fixed for those animals in so far that it persistently kills them in from six to eight days. Such virus, through these passages, acquiring a greater pathogenicity for rabbits, is less virulent for other animals and man. It has been found that even comparatively large doses of such fixed virus will not produce the disease in other animals than rabbits. In taking advantage of this fact, Hogenes developed the dilution method whereby he proved that in successive vaccinations with the fixed virus an immunity

may be produced which will effectively prevent the development of the disease in man and animals. The first injection is made with the very high dilution of virus and gradually the dilutions are reduced in the successive injections.

This method of immunization has also been employed to a very great extent in veterinary practice. The statistical data available show that in approximately 10,000 vaccinations of exposed animals only 28 developed the disease, which must be considered as splendid results, inasmuch as some of the vaccinations were undertaken after a considerable time elapsed from the time of exposure before the administration of the vaccine.

In all the methods, however, especially those employed for the prevention of the disease in man, a great number of vaccinations are required to produce the desired immunity. This factor naturally has a decided disadvantage in the application of this treatment in veterinary practice, in view of the fact that the animals in most instances have only an intrinsic value and only in a few cases is there any desire to save the animal for sentimental reason. As a result of this condition, the vaccination in animals has never been generally adopted.

If we consider, on the other hand, the causes which are responsible for the existence and the spread of the disease, we can not help but realize that the dog is the principal agent incriminated, and if we could effectively eliminate the prevalence of the disease in dogs there is no doubt that the disease could be controlled and eradicated. The long distances which rabid dogs travel, biting animals and persons met on their way, makes the persistence of the disease in localities and countries possible. Sanitary police and other legislative measures employed from the time of the earliest history of the disease could not effect its diminution. Muzzling, quarantining and prohibiting dogs to run at large have also failed in their purpose. In order, therefore, to control the disease effectively, investigators have aimed to develop a protective vaccination whereby it would be possible to vaccinate dogs against the infection so as to protect them against any natural exposure.

The possibility of injecting animals with altered fixed virus suggested itself as a means of an effective vaccination. Various investigators have proved that it is possible to confer upon

animals an immunity by the injection of such fixed virus. None of the methods suggested have ever been applied in practice for the purpose of protecting dogs which have not been exposed to the disease. More recently,¹ however, as a result of the tremendous spread of the disease in Japan through the war, they felt obliged to adopt some means whereby the ravages of the disease might be checked. Through the application of experimentally effective vaccination of dogs, they have proved in practice that it is possible to confer upon animals with a *single injection* a sufficient immunity which will protect them for at least one year against any bites to which they might be exposed by other dogs.

The vaccination consists of a single injection of a large dose of phenolized fixed virus. It is prepared by collecting and grinding the brain and spinal cord of a rabbit in which rabies developed in seven days from the injection of fixed virus. To this amount four times its volume of phenolized glycerin water is added. The glycerin water consists of 60 parts of glycerin to 40 parts of water containing 1.25 per cent phenol. This mixture was called the original vaccine and was stored at room temperature of 18° to 22° C. for two weeks, or in an ice chamber 30 days to reduce its virulence. When first used this vaccine was diluted to one-twentieth, but later it was given in a dilution to one-fifth, that is, in its original strength. This vaccine can be stored much longer than ordinary rabies vaccine, and from data it will remain active two to three months at room temperature.

Dosage of Vaccine.—When the experimental work was done, the dosage ranged from a fraction of a cubic centimeter up to 6 c.c., and the number of injections from four to one, and a dilution of from one-twentieth to one-fifth of the original vaccine to the concentrated original vaccine itself, which is diluted to one-fifth or 1 to 4. It was finally established that one injection of 5 c.c. per 15 kilograms weight of one-fifth dilution should be used, and that for puppies of 4½ kilograms or less one-half the dose of 6 c.c. should be given.

These findings were based on very extensive experimental work, and only after the experiments had proved the effective-

¹ A study of the anti-rabic inoculation of dogs and the results of its practical application, by S. Umeno and Y. Doi, in the Kitasato Archives of Experimental Medicine, vol. IV, No. 2, pp. 89-108.

ness of the method was vaccination undertaken on a large number of dogs in practice.

Since that time and up to 1921, 31,307 dogs were vaccinated in the Prefectures of Kanagawa and Tokio, with the results that only one animal died from accidental causes following vaccination and in only one case did the vaccination fail in producing a sufficient immunity against natural exposure. On the other hand, the disease continued to rage among the unvaccinated animals. The vaccination in these two prefectures resulted in a 75 per cent reduction in the number of cases of rabies, the disease occurring only in the dogs which were not immunized.

In order to prove whether such a high degree of immunity is actually produced by the vaccination, the writers undertook a series of experiments, the results of which are given in Table 1 and Table 2.

TABLE 1.—RABIES VACCINATION EXPERIMENTS ON DOGS.

DOG No.	DATE VACCINE INJECTED	AMOUNT INJECTED SUBCUTANEOUSLY	LABORATORY No.	DATE STREET VIRUS INJECTED INTRACULARLY	AMOUNT ¹	RESULTS
1	Oct. 4, 1921	5 c.c.	16	Oct. 29, 1921	0.05 to 0.1 c.c.	Living Feb. 15, 1922
2	do.	do.	16	do.	do.	do
3	do.	do.	16	do.	do.	do.
4	do.	do.	16	do.	do.	do.
5	do.	do.	16	do.	do.	do.
6	do.	do.	16	do.	do.	do.
7	Control			do.	do.	Died Nov. 13, 1921, dumb rabies ²
8	do.			do.	do.	Died Nov. 14, 1921, furious rabies ²
9	do.			do.	do.	Died Nov. 15, 1921, furious rabies ²

¹The infective dose of street virus was made up of a suspension of medulla and hippocampus of three different dogs known to have died of street rabies. The suspension was made up in the proportion of 1 gram to 10 c.c. salt solution.

²Diagnosis of rabies verified by microscopical findings and inoculation of rabbits. See Table 2.

To verify our clinical diagnosis of rabies in the three check dogs shown in Table 1, in each case the brain was removed, examination for Negri bodies made, and an emulsion from each brain reinoculated intradurally into two rabbits each as shown in Table 2.

As will be noted from the tables, the six vaccinated dogs successfully resisted the injection of a dose of street virus which proved fatal to the three controls, the latter developing the disease in from 15 to 17 days, which for dogs is considered

TABLE 2.—RABBIT INOCULATIONS TO VERIFY DIAGNOSIS OF RABIES IN CONTROL DOGS
TABLE 1.

RABBIT No.	DATE INJECTED	BRAIN FROM DOG No.	DATE DIED	REMARKS
1	Nov. 16, 1921	7	Nov. 16, 1921	Shock from trephining awl
2	do.	7	Nov. 28, 1921	Rabies ¹
3	do.	8	.....	Living Dec. 8, 1921
4	do.	8	Dec. 1, 1921	Rabies ¹
5	do.	9	do.	do.
6	do.	9	Dec. 6, 1921	do.

¹ Diagnosis of rabies verified by microscopical findings.

a short period of incubation; therefore, the injected dose of the street virus must be considered as highly infective.

These experimental findings would justify the conclusion that dogs vaccinated with a single injection of phenolized fixed virus may be protected against large doses of street virus. These results are of great significance, inasmuch as this method of vaccination offers a possibility of controlling, if not eventually eradicating, the disease. In localities where the disease is very prevalent, its spread might be checked by compulsory vaccination of all dogs. The advantages of a protective vaccination against rabies are not only of great importance from an economical and veterinary police standpoint, but more so for public health reasons.

STRASBURG TO CELEBRATE PASTEUR CENTENARY

The centenary of the birth of Pasteur is to be observed in May, 1923, by a great celebration at Strasburg, France, under the auspices of the University of Strasburg with the cooperation of the Pasteur Institute and the family of the distinguished scientist. It has been decided to erect a monument at the University, where Pasteur, as professor, began his career of fame. The ceremonies will include the opening of an exposition of hygiene and bacteriology to show progress due to Pasteur's discoveries. A congress of hygiene and bacteriology will also be held for the discussion of such problems as tuberculosis, cancer, syphilis, leprosy and filterable viruses.

At the last convention of the National Veterinary Association of Italy, held at Ravenna, an increase of membership from 1,300 to 2,000 was reported. The dues include the price of subscription to a professional journal.

THE VALUE OF ANAEROBIC CULTURES¹

By GEORGE W. STILES, JR.

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THE PREPARATION of anaerobic cultures probably does not constitute a part of the daily routine procedure in the average bacteriological laboratory. Doubtless there are exceptions to this general statement; however, unless one suspects the presence of anaerobes in a particular case, cultures to detect this type of organism are usually neglected.

Unless cultures are made to determine the possible prevalence of both anaerobic as well as aerobic organisms, one is not justified in concluding that the specimens under consideration are free from living bacteria or that all organisms present in some portion of the animal have been found.

During the past three years nearly 2,000 specimens of various kinds have been examined bacteriologically in the Denver Branch Laboratory of the Pathological Division, and in many instances, when aerobic cultures only were made, the results from bacterial growth were negative, but later, when some of these same types of tissues were cultured both anaerobically and aerobically, the results showed the presence of anaerobic organisms only, which specimens would previously have been considered sterile when aerobic methods alone were employed.

This is particularly true with the investigations being made on sheep losses resembling braxy. In this work the recent disclosures show the majority of specimens examined to contain but the anaerobic group.² During the month of December, 1920, 13 out of 18 sheep examined showed only anaerobic organisms from one or more of the viscera.

In the further discussion of this paper five divisions of the subject may be considered as related to the general theme.

I. KILLED SICK ANIMALS FOR AUTOPSY

According to various writers and personal experience, the selection of proper material is the first essential consideration in the study of any specimen for bacteriological study.

¹ Presented at the Fifty-eighth Annual Meeting of the American Veterinary Medical Association, Denver, Colo., September 5-9, 1921.

² Losses among sheep in the Rocky Mountain region. George W. Stiles, Jr. Jour. Amer. Vet. Med. Assoc., June, 1921, p. 322.

Representative cases showing visible evidence of illness from a herd of infected animals should, if possible, be slaughtered for autopsy purposes. From such carcasses portions of the lung, liver, spleen, kidney, glands, muscle and blood may be selected and preferably cultured at once. If this is impracticable the tissues should be either well iced or packed in a generous quantity of dry powdered borax and taken to the laboratory as quickly as possible for making cultures. In a few instances where fresh specimens have shown few, if any, organisms when first received, these same tissues, when held in the ice box for 24 to 48 hours, have shown a greatly increased number on the second examination.

Animals dying naturally from disease, particularly if allowed to remain for some time after death, are more liable to show a wider variety of bacterial flora, and especially saprophytic and putrefactive types from the intestinal tract; hence the value of cultures prepared from moribund slaughtered animals; also the chance of foreign tissue invasion is reduced, and the likelihood of isolating the causative organism is made more possible.

II. PREPARATION OF CULTURES

Doubtless each laboratory worker has his own method of making cultures; however, one general principle is recognized by all who are engaged in this kind of work. The nature of the culture medium used, its reaction and other characteristics, may vary according to the individual, but by following standard methods the personal element is reduced to a minimum.

In brief, one should remove from a specimen enough material by the use of heated spatula, platinum wire and sterilized instruments to insure a growth if any appreciable number of organisms are present. A small loopful of blood may not contain a single organism, whereas the inoculation of the 0.5 c.c. or more may insure growth. In making aerobic cultures, both liquid and solid media are desirable. Anaerobic cultures of course require the exclusion of free air from the medium used.

Recently sterilized Smith fermentation tubes have been conveniently used for liquid media, by introducing a small portion of tissue with sterile forceps beyond the bend of the tube. Various kinds of liquid culture material, such as plain or sugar broth,

milk, egg albumen and other substances, may be used in this manner.

Shake agar tubes, either plain or otherwise, are often used to advantage for primary anaerobic cultures. Such cultures may be made in conjunction with the liquid Smith tube cultures.

Incubation should be made sufficiently long to permit development of slow-growing organisms, should they be present.

III. SEPARATION OF SPECIES

The development of primary cultures, whether anaerobic or aerobic, may be a comparatively simple task, but their separation is not always such an easy matter. If aerobic species only develop, the plating method by using suitable solid media easily separates the colonies for their growth in pure strains.

When mixed cultures develop, containing both spore-bearing anaerobes and aerobes, the problem becomes more complicated. Aerobes may be separated by aerobic methods of growth. The anaerobes will require more skillful methods. Application of heat to the liquid cultures in the water bath may be an aid in separating the various types of bacteria.

For example, a liquid spore-bearing culture may be heated at 70° C. for a period of one hour or longer, and subcultures removed at intervals of every five minutes' exposure and transferred by pipette to a sterile Smith broth culture and incubated. This method would separate the nonvegetative, less resistant species from the spore-bearing types. Further purification may be necessary by using a series of dilutions in small shake agar tubes from the heated strain, and selecting a tube showing relatively few colonies for additional study.

The use of a low-power lens will aid in identifying the various types of deep anaerobic colonies in shake agar cultures. The gentle application of heat from the gas burner to the distal end of a shake agar culture will expel the contents into a sterile Petri dish. This column of agar containing well separated colonies may then be divided by a hot platinum wire into segments, each containing a single colony. The single fragments of agar containing but one colony are then transferred to suitable media for development. Several such colonies should be fished from the agar plug, particularly if there appears to be more than one type present, and further studied for determina-

tion of purity. When a culture is once determined to consist of a single species, then its pathogenic and biological features may be determined.

IV. PATHOGENIC PROPERTIES

The pathogenic properties of an anaerobic organism are usually determined on guinea-pigs, rabbits, white mice or other small animals. However, it is preferable to test the organism finally on the same kind of animals from which the strain was originally isolated.

Having separated the organism in pure culture, the matter of dosage to be given and the manner of administration will vary according to individual cases. Anaerobic organisms are generally injected either subcutaneously or deep into the tissues; they probably would not develop if introduced intravenously. A careful postmortem examination of the dead laboratory animal should be made, noting the presence or absence of swellings, gas in the tissues, distribution of lesions, conditions of each viscus, and finally, suitable cultures should be made to recover the strain injected into the animal.

V. CLASSIFICATION OF ORGANISMS

Having separated the organism in a pure culture and determined its pathogenic properties, its further identification may be accomplished by a study of its biological characters. Staining reactions, morphological characteristics, motility tests, its growth and behavior in various kinds of culture media, its ability to ferment sugars, liquefy gelatin, coagulate milk; all these aid in placing the organism in some known group of bacteria.

Bacteriological investigations of anaerobic infections present many complex problems. According to Heller¹ it is probable that many of the early anaerobic studies were made with mixed cultures, consequently the conclusions drawn were not justified in the light of more recent disclosures on strains developed from single colonies.

The recognition of the causative factor in the obscure diseases afflicting domestic animals is necessary before satisfactory

¹ Etiology of acute gangrenous infections of animals. A discussion of blackleg, braxy, malignant edema and whale septicemia. *Jour. Infect. Diseases*, vol. 27, No. 5, Nov., 1920, pp. 385-451.

progress can be made toward preventing or alleviating such maladies.

Through the study of anaerobic cultures, in addition to the usual aerobic methods, it may be possible to gain much information of value pertaining to these diseases which exact such a heavy toll of livestock annually.

RUSSIAN LIVESTOCK RAVAGED BY DISEASE

The ravages of animal diseases are not the least of the troubles that afflict Russia, according to a correspondent of the French *Revue Générale de Médecine Vétérinaire*. Rinderpest is said to be raging in all provinces and to have reduced the number of cattle by two-thirds. Glanders is widespread among horses. A clinical examination of 5,000 remounts at Kiev revealed 800 affected with glanders, and with no measures being taken to combat the disease it was believed to be only a question of time when practically all of these animals would become infected. Thousands of persons have contracted glanders, and special hospitals for their treatment have had to be provided.

The direction of the Russian veterinary service has been confided to a former hospital attendant in the Red army. He has established a Bolshevik veterinary school in which the course is reduced to one year.

It is easy to see, says the French journal, that the Russian flocks and herds are in danger of almost complete extinction, and that this condition is not without interest to the outside world.

Topcka Daily Capital reports that officials of the Russian government are purchasing horses by the thousands in Kansas, Colorado, and Wyoming, and concludes: "They are negotiating to have these horses slaughtered and the meat canned and shipped to Russia in train-load lots."

The Hon. José M. Collantes, Secretary of Agriculture, Commerce and Labor for Cuba, advised Secretary Mayo that a veterinarian representing his department will be sent to the next meeting of the American Veterinary Medical Association in St. Louis.

POISONOUS PLANTS OF THE WESTERN RANGES ¹

By C. DWIGHT MARSH

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THERE WAS A QUESTION in my mind when I was invited to speak on this subject as to just exactly what I had better say. The subject is a very broad one. I might simply give a list of poisonous plants, but by so doing I would overstep the time. Twenty minutes would not allow me to give a list. I might take one plant and treat of it in detail. I should then overstep my time limit without any questioning. It seems to be wiser, before an audience of this kind, many of whom come from the East and are not especially familiar with western conditions, to speak in a general way in regard to some of the plants which are poisonous on the western stock ranges. I can not speak of all of them, of course. I can not speak of any of them in detail, and what I will say will be non-technical and sketchy of necessity. My idea, then, is simply to go over, very briefly indeed, just a few of the most poisonous plants of the West.

There are poisonous plants—plants poisonous to livestock—all over the United States, but the losses in the East are negligible as compared with those in the West. This results from a number of reasons. One is, of course, the different way in which livestock is handled upon the ranges. Cattle are turned loose, sometimes not seen for weeks, perhaps not for months, and drift upon areas of poisonous plants, perhaps at times when there is a shortage of other forage, and many, as a result, are poisoned. Sheep are generally kept under a herder and moved from place to place in more or less close formation. If, through the ignorance of the herder, they move over a patch of poisonous plants, some of them are likely to suffer. Many of the sheep are moved upon trails over which a large number go. They become very hungry, and if, upon emerging from these trails, they come upon poisonous plants, they suffer. Then there are more poisonous plants in the West than there are in the East, and they grow in larger numbers; that is, in larger patches.

¹ Presented at the Fifty-eighth Annual Meeting of the American Veterinary Medical Association, Denver, Colo., September 5-9, 1921.

In general, stock poisoning is due to shortage of food. I make that as a general statement. There are certain exceptions. For example, stock do get a loco habit; but generally speaking, no poisonous plants are eaten by choice. Shortage of forage is the main cause of the losses from poisonous plants. So far as remedies are concerned, there are few medicinal remedies that can be used under the ordinary conditions of handling livestock. There are certain plants for which we can have remedial measures, but generally speaking, that is not the case. Reliance must be put upon prevention and not upon cure.

Thinking it might interest you, I have brought in specimens of a few of our more common poisonous plants of the West. It is very difficult to get many of them at this time of the year.

(Fresh specimens of the following plants were shown: The whorled milkweed (*Asclepias galioides*); *Zygadenus*, or death camas; the western sneezeweed, or *Helenium hoopesii*; the Colorado rubber plant (*Hymenocys*); high larkspur and aconite.)

I will now show a number of lantern slides and go over them rapidly.

ZYGADENUS OR DEATH CAMAS

Of all the plants poisonous to sheep, probably the one that occasions the greatest loss on the whole is the plant or plants known as "death camas," or *Zygadenus*. These plants grow all over our western ranges and are responsible frequently for losses of hundreds of sheep. The largest individual loss that I happen to be personally familiar with was 900 out of a band of 1,900. Similar losses are not at all unusual. The plant is, in the main, a spring plant, and the losses occur in May and June. The first work which was done by the Department of Agriculture on *Zygadenus* was done on a species growing in Montana, which is the species growing also commonly in Wyoming, and it was assumed that all forms of death camas were poisonous. Death camas is ordinarily called lobelia on the Pacific slope.

Zygadenus venenosus grows typically in California and in the States adjoining. It does not grow, so far as I know, in this neighborhood. The plant grows from a bulb and its leaves are grass-like. It has a group of greenish yellow flowers. All the species of *Zygadenus* resemble this. This particular species grows in

wet meadows and grows in such masses that it not only poisons grazing animals but sometimes makes the hay dangerous. *Zygadenus* poisoning results generally from a dosage of half a pound. The symptoms are salivation, nausea, vomiting, followed by great weakness. Sometimes a sheep will lie for hours or even days before death. Ordinarily, however, these cases are acute. *Zygadenus* will poison horses and cattle, too. It does not commonly cause fatal trouble with horses, but does make them very sick. It may also get cattle, but ordinarily, these animals are not seriously poisoned under range conditions.

Zygadenus paniculatus is the species of death camas that grows in the intermountain region. The leaves are thick and it grows on the dry hills, never in meadows.

Zygadenus elegans is the mountain death camas, which, in the West, grows only in the high mountains, 8,000 feet and more above sea level. It grows two feet or more in height.

Some botanists name other species of this plant, but these are the generally recognized species. We have been able in the last two or three years to get material of all these species and to determine experimentally their comparative toxicity. It has been shown that this particular plant, from which we have warned sheepmen for years, is so slightly poisonous that no stock are ever poisoned by it under range conditions. It has been shown that the *paniculatus* growing in the intermountain region is only about one-third as poisonous as the plant growing in Montana, or the plant growing in California. The plant growing in Montana is known as *Zygadenus graminicus*, but it looks very much like the other. These results in regard to comparative toxicity have been very interesting to us, and unfortunate in one way, because we have had to take back what we said before in regard to its poisonous properties.

THE LUPINES

Next to the death camas, probably the plants that get the most sheep are the lupines, the "blue bean" as it is sometimes called in the West; Indian beans, as we used to call them in the East. The leaves of this plant are not particularly poisonous, but the seeds are very poisonous to sheep, and the pods are somewhat toxic. It is a curious fact that sheep will graze upon these a whole season without harm if they do not eat a toxic dose within a comparatively limited time. The poison is not cumulative and

small quantities are eliminated. About half a pound of the seed will ordinarily poison a sheep. In the fall when they come from summer range and are trailed too rapidly, so that they become very hungry, if they come upon thick patches of lupine in pod, there are sometimes heavy losses.

A very unfortunate thing about our knowledge of lupines is the fact that we know so little about the different species. There are about 200 or 300 different kinds. Some of them are poisonous, some not, and at the present time we have exact knowledge only in regard to a very few of them.

An interesting thing about sheep poisoned with lupine is that they are likely to run about in a crazy way, butting into one thing and another. Animals poisoned in the corral will push their heads against the side of the corral and hold themselves in the same position by the hour.

THE LAURELS

There are in California two or three kinds of laurel that poison a great many sheep in the spring. The black laurels grow in limited patches. They are very easily avoided, but a great many sheep get upon them simply because the herders are ignorant in regard to the character of the plants. In California is another plant known as the white laurel (*Azalea occidentalis*) that gets a great many sheep in the spring. Eastern laurels are also poisonous to livestock, especially the mountain laurel (*Kalmia latifolia*) and the sheep laurel (*Kalmia augustifolia*).

COLORADO RUBBER PLANT

The Colorado rubber plant (*Hymenoxys floribunda*) is a very interesting kind of plant. As a matter of fact it has rubber in the base of the plant and has been exploited commercially. However, the quantity of rubber was not sufficient to make it profitable. This grows abundantly in parts of southern Colorado and northern New Mexico and is responsible for losses of a great many sheep, more particularly in New Mexico. The story among many sheep men is that the sheep masticate the roots and separate the rubber, which collects in masses and produces intestinal obstruction. This has no foundation in fact, and the story has probably come from the ordinary hair balls that are found in the stomachs of sheep. The plant, however, does poison and kill them.

THE LARKSPURS

Of the cattle-poisoning plants besides the loco, the worst without any doubt are the species of larkspurs. These larkspurs, for our purposes, may be called "high" and "low." There are a number of species. The low larkspur grows in this neighborhood in May and June. It dies about the first of July and disappears, while the high larkspur keeps on growing during the summer. The low larkspur sometimes grows in masses, and then it does a great deal of harm.

A white larkspur grows on the plains from Colorado down as far south as Texas, which is responsible for some losses of cattle. All these larkspurs are equally poisonous.

In larkspur poisoning on the range, generally the first thing noticed is that when the cattle are driven, they fall. In corral cases they step about uneasily, finally their legs double up under them and they fall, and they are unable to get up; yet they may rise within a few minutes and sometimes nothing more happens, or the thing may be repeated several times. If they are badly poisoned they go down upon the side, vomit, and die of respiratory paralysis. Eserin seems a sovereign remedy if given at the proper time. We have 95 to 100 per cent recovery where we have used eserine. Under normal conditions, however, if the animals are left alone with their heads up-hill, so that the stomach and intestines can fall away from the lungs, about 50 per cent will recover without any remedy.

SNEEZEWEED

Sneezeweed grows abundantly in Utah and also in parts of western Colorado. The eradication of this plant is difficult if not impossible, for it is a strong, healthy organism, reproducing both from seeds and from roots, and has no known insect enemies. In many places it has practically taken possession of the range.

Several years ago, while passing through Utah, we were told of a "spewing disease" of sheep. From the description we thought it was death camas poisoning, and men sent upon the range to examine the plants found an abundance of *Zygadenus*, and a diagnosis was made of *Zygadenus* poisoning. When our station was established on the range and we were able to make a careful study of the subject, it was found that the sneezeweed was the cause of the spewing sickness. When in blossom it is a

very beautiful plant. The effects of the plant are cumulative and permanent, and the microscopic examination of tissues has shown that a cure is probably impossible. I have sometimes seen thirty or forty sheep throwing up their heads and vomiting from the effects of this plant. We had reason to think that the sneezeweed might be poisonous to cattle under some circumstances, and it was fed out with that in view. Nausea and vomiting were produced.

WILD CHERRY

The wild cherry, which grows East as well as West, gets a great many sheep because of the hydrocyanic acid in it. The most prominent symptom is the gasping for breath because of the lack of oxygen.

WHORLED MILKWEED

The whorled milkweed has occasioned much trouble in western Colorado. For many years we had heard a great deal about milkweed poisoning, but until about four or five years ago nothing definite was known. At that time some very remarkable cases occurred in western Colorado. Two or three ounces of this plant will poison a sheep and a correspondingly small amount will poison cattle or horses.

The whorled milkweed grows in Colorado, Utah, Arizona and New Mexico, and is abundant in the valleys of the Colorado and Gunnison rivers. The plant will grow from a small portion of the root. It is impossible to eradicate it on that account. The whorled milkweed is very poisonous. Poisoned animals have the most violent convulsions.

There are several kinds of whorled milkweeds. We have been able in the last two or three seasons to make comparative studies of them. The Mexican whorled milkweed grows abundantly in the San Joaquin and Sacramento valleys in California and in some of the neighboring States. The dwarf whorled milkweed grows on the plains. It is only about a quarter as poisonous as the one growing in western Colorado. There is another one growing in the East that probably never poisons animals at all. While the Mexican whorled milkweed is only a quarter as poisonous as the Colorado plant, it poisons great numbers of sheep, particularly in California. The dwarf whorled milkweed, growing in the plains region, probably never does much harm because it does not grow in masses.

LOCO PLANTS

The ordinary white loco or rattleweed (*Oxytropis lamberti*) of the plains is the most common loco plant and the most destructive of all, because it poisons cattle, horses and sheep. The plant grows thickly in the Yellowstone Valley in Montana. The Texas loco, also known as purple loco, and sometimes called woolly loco, affects only horses as a rule. It grows in Nebraska and the States south and southwest. We know that there are a number of loco plants. The *Astragalus diphysus* poisons horses in Arizona and to some extent in New Mexico. It also affects cattle, although it is considered particularly a horse-poisoning plant. It may be called the blue loco. Another related plant poisons cattle and sheep in southern Utah, New Mexico and Arizona. Still another, *Astragalus tetrapterus*, which is limited in distribution, growing only in Utah and Nevada, poisons sheep and cattle.

Locoed animals lose a certain amount of muscular coordination. A comparison of the curves of weights of two young cattle, one addicted to loco eating and the other not, shows that the second animal gained continually, while the first began to lose soon after beginning to eat loco. Loco is a chronic poison affecting horses, cattle and sheep. Symptoms appear after eating the plant two months or more. Lambs sometimes will be poisoned in two or three weeks. Good food and treatment with strychnine for several weeks will go far toward overcoming the effects and make it possible to get meat animals into condition for marketing for slaughter.

Dr. R. A. Gregory, formerly with the B. A. I. at Texarkana, Texas, has recently purchased the Veterinary Hospital at Rogers, Ark., and has resigned from the Government service to reenter private practice.

Dr. Homer A. Wilson has just been appointed State Veterinarian of the State of Missouri to succeed Dr. D. F. Luckey. The JOURNAL extends to Dr. Wilson congratulations and best wishes for a successful term. He will make his headquarters at Jefferson City, Mo.

THE ECONOMIC IMPORTANCE OF ERADICATING TUBERCULOSIS ¹

By THOMAS E. WILSON

President, Institute of American Meat Packers, Chicago, Ill.

THE ECONOMIC IMPORTANCE of eradicating tuberculosis can best be appreciated when consideration is given to the enormous waste for which this disease is primarily responsible. Unlike many of the plagues affecting the animal kingdom, the ravages of this disease are not confined to any certain geographical areas, or to any one species of the animal kingdom, but instead it is widespread in its scope of destructiveness.

Tuberculosis, as a factor in our economic structure, cannot be overestimated. It has shattered and destroyed the fond hopes of home and fireside. It has transformed individual initiative and aspirations into lives of utter uselessness with all the accompanying sufferings and discouragements. It has plucked the bloom of health from thousands of our babes, children, and adults, thus depriving the nation of the man-power represented in a strong and stalwart citizenship that was or would have been. It has transformed successful careers into failures. It has brought suffering, sorrow, misery, and poverty to multitudes without any regard for age, sex, physical condition, or station in life. It has not confined its ravages to the human family alone, but has also extended its avenues of destruction to our domestic animals, thereby proving a menace to the livestock industry, and widening the opportunities for further spread by infecting an essential food supply of our people. It has shown a preference for the family and dairy cow, the foster mother of millions of our babes, and in the milk supply it has found for itself an excellent medium through which its deadly bacilli—if not prevented—are carried to helpless babes and the unsuspecting public.

Tuberculosis does not limit itself to infecting this important food (which also serves as an infective agent for extending its ravages to swine and calves) but further, the tubercule bacilli

¹ Presented at the Tuberculosis Eradication Conference, Chicago, Ill., November 25 and 26, 1921.

find their way into the excreta of the bovine, which greatly adds to the source of infection among swine.

The increase of tuberculous infection among swine during the last decade indicates that their eating habits constantly expose them to infection when they are required to associate themselves with tuberculous cattle. This, I think, constitutes a problem that can be readily solved through the eradication of the disease from cattle, and I therefore feel that the policy that is being pursued by you gentlemen in centralizing your efforts toward the eradication of the disease in cattle is fully justified.

Accepting, as we are obliged to, that the foregoing statements are facts, it would seem that this disease presents two important aspects, namely: Its relation to the public health, and its importance from an economic standpoint.

I will deal briefly with the subject strictly from the standpoint of its economic importance. It can be easily understood how the jeopardizing of the public health affects our economic situation. Anything that has a depressing effect upon our people cannot help lower the morale, an item which is considered of vital importance to the efficiency of any nation.

Tuberculosis saps the vitality and often the life out of those who are unfortunate enough to become infected. It thus reduces the energy of the man-power of the nation to an extent that must be recognized as contributing to a national waste, thereby lowering our standards of efficiency. Lost efficiency from any cause is economically unsound, therefore the eradication of this disease from the human family is of considerable economic importance.

The history of tuberculosis in the United States indicates that slowly but surely it has been the cause of diverting millions of dollars from avenues of production to that of being used in offsetting its own ravages, which are now recognized as a great agent of destruction.

Sanitariums, special hospitals, isolation camps and farms, milk-pasteurization plants, livestock sanitary and public-health departments, equipment and other expensive quarantine barriers and measures, Federal, State, county and municipal appropriations and indemnity funds, stand as monuments to the onward march of this disease. While these investments, equipment, organizations and expenditures of money are absolutely

necessary for properly executing our efforts to control this disease, or care for those afflicted, the economic advantages of eradicating it must be apparent to all.

As livestock sanitarians, you men are perhaps primarily interested in the economic importance of the eradication of this disease in its relation to the agriculture of the nation. The agriculture of the United States is peculiarly one of livestock, for the reason that a very definite percentage of all the grain produced is marketed through feeding it to livestock. Since successful agriculture is so essential to the prosperity of the nation, it is necessary that our attention be directed to the conservation of our livestock.

No one is more familiar than you gentlemen with the losses to the individual breeders and livestock producers as result of tuberculosis. You have seen purebred herds exterminated, that perhaps not only represented the savings of a lifetime, but also the loss of breeding animals of excellent types that represented the application of scientific breeding principles over several generations.

Under such circumstances, the loss is not alone with the individual, as such is keenly felt by the general agricultural interests of the nation. The production of inferior types or scrub livestock is economically unsound; therefore, the livestock industry can little afford to permit its breeding animals being sacrificed through the ravages of tuberculosis.

The individual and national losses are not confined to animals of pure breeds, but, instead, we know these losses are being experienced by the owners of cattle and swine of all breeds and grades.

The authorization of appropriations that permit the payment of indemnities was, I think, one of the best steps taken to encourage tuberculosis-control work. While these appropriations serve to reduce the losses to the individual, it must not be overlooked that each payment of indemnity indicates that a loss has been experienced both to the government and to the individual.

The economic importance of tuberculosis in its relation to the livestock production in the United States is reflected through the records of the Meat Inspection Division of the U. S. Bureau of Animal Industry for the fiscal year ended June 30, 1921.

During the period there were slaughtered under Federal inspection 8,179,572 cattle, of which 173,328 (which is in excess of 2 per cent of the entire kill) were retained on post-mortem inspection for tuberculosis. Of the total retained 33,328 of these cattle were condemned outright and destroyed for food purposes by inspectors of the U. S. Bureau of Animal Industry. Without giving any consideration to the direct losses represented through the condemnation of organs and parts in the retained carcasses, the total amount of beef represented in the condemnation of these cattle based upon a live weight of 968 pounds average on the Chicago market for the same period is equal to 17,421,212 pounds.

The hog kill under Federal inspection for the same period equaled a grand total of 37,702,866, of which 4,693,305, or 0.1212 per cent were retained for tuberculosis, and a total of 64,830 hogs condemned outright and destroyed by Federal inspectors for food purposes. On the basis of the average live weight of hogs sold on the Chicago market for this same period, the loss in the available meat supply showed 10,403,918 pounds. It must also be kept in mind that the total number of organs and parts condemned in connection with the retentions of swine for tuberculosis will far exceed the losses on the condemnation of carcasses. A presentation of the case on the basis of only taking into consideration the losses in the available meat supply from those carcasses which are condemned outright, is in itself very interesting. Using as a basis the per capita consumption of 154.3 pounds of meat per annum, and also that five persons constitute the average American family, the amount of meat loss is equal to a supply sufficient to provide the meat diet of 36,063 American families.

The packing industry is deeply interested in this great economic waste, which can not be measured alone in the loss of carcasses, organs and parts, but also added expense of operations in handling this class of carcasses in line with approved meat hygiene regulations.

The packing industry, like all other industries, is vitally interested in the supply and quality of its raw materials, and it, therefore, has closely observed for many years the changing conditions that have such a direct bearing on the conduct of the business. The industry has observed a gradual increase in the

public markets, and upon which freight, feed, yardage, and commission charges, etc., were paid. The condemned cattle in Federally inspected establishments for the fiscal year ended June 30, 1921, represented 1,515 earloads of animals supposedly healthy and fit for human consumption, but instead of their being converted into meat food products, they were destroyed for such purposes by being consigned to a rendering tank upon their arrival. The total number of hog carcasses condemned in the same establishments covering the same period, reached a total of 997 earloads, and the same disposition was made of them.

It is reported that some packing plants have as much as 40 per cent of their weekly kill retained for this disease. Under these circumstances such a plant is operating at a disadvantage, as it can not serve, to the best advantage, the community in which it is located, because of competition from the packing concerns that are fortunately located in sections of the country where there is less tuberculous infection.

One might go on at some length describing the many possible disadvantages and losses brought about by the prevalence of this disease in the United States, yet I realize that you men are here to discuss ways and means of improving upon the commendable work that you now have under your direction.

I can say to you that the Institute of American Meat Packers is vitally interested in your efforts, and it is the purpose of the officers and members of the Institute to assist you in bringing about a close cooperation between all agencies that are actively engaged in the work looking toward the control and eradication of this disease.

The packing industry, I think, has pioneered in connection with the systematic work that has been developed in connection with approved methods of control and eradication. As most of you men know, the industry had representation on the Sanitary Committee of the Chicago Live Stock Exchange, which committee was very active in its cooperative efforts with Federal and State departments in bringing about a recognition of the righteousness of your cause and the financial assistance necessary to inaugurate a general and well-defined plan for combating tuberculosis.

There are no doubt many people still unfamiliar with the im-

portance of your efforts, and I can see the necessity for continuing a campaign of education in order that all elements will become more appreciative of your efforts in the interest of the general welfare, which, in turn, should result in improving the well-established operations now in effect.

The packing industry, especially in Chicago, has worked very closely with the Sanitary Committee of the Chicago Live Stock Exchange, and many of the different packing companies have for several years been conducting special killing tests of cattle and swine in order to furnish first-hand information to the Live Stock Commissioner of the Exchange, who, in turn, not only used such information for locating points of infection, but also as a basis for getting the community interested in some plan of eradication work.

The work of the Chicago Live Stock Exchange has been commended by the U. S. Bureau of Animal Industry as being very beneficial to them in assisting in bringing about the cooperation necessary to fight tuberculosis. Results obtained through the activities of this committee were so encouraging that the work was finally taken up by the National Live Stock Exchange, which is now operating a similar cooperative plan on most of the large markets. This work, I think, has a great future, and I hope that, as in the past, it will continue to prove a valuable asset to your undertakings.

The industry realizes that tuberculosis presents so many different angles that it is necessary to maintain a proper interest and cooperation between all elements concerned. It is gratifying to note that many communities have taken up area work, and are demonstrating the practicability of eradicating the disease in certain specified areas. I believe that this plan has many possibilities, and I am quite sure that the packing industry will be glad to cooperate in any way that it can.

One of the problems which I know has given you some concern is the proper disposition of reacting animals. The Institute became interested in this matter, and by resolution signified its desire to cooperate fully by purchasing all reacting cattle subject to post-mortem inspection on the basis of paying for them the same price that is paid for animals of the same class not known to be reactors.

I must not go away from this place today without saying a

few words of commendation for the splendid achievements that have already been realized through your joint efforts. I think the United States is extremely fortunate in having at the head of this important work a man of such exceptional scientific and administrative ability. Dr. Mohler has pointed, and can continue to point the way. All he needs is the unstinted support and cooperation of all elements concerned. I am sure we can pledge this to him.

The nation is also fortunate in possessing a wonderful corps of livestock sanitary experts as are gathered here today. Gentlemen, we can not content ourselves with our accomplishments thus far, but, instead, we must firmly resolve to go forward.

We still have many problems confronting us, and if I may be permitted, it is my desire to briefly mention one or two. Our legislative bodies have been very considerate in legislating in the interest of appropriations and special quarantine laws. These laws in a degree are more specific in their application to the livestock owner than to any one else.

I hope to see the day when every citizen in this country will be cognizant of the fact that there are specific laws on our statute books that carry severe penalty for any one who attempts to traffic in tuberculous animals, or who by special knowledge of the tuberculin test, or by other means, will "plug," or in any way assist in such unlawful traffic.

Another matter which I personally feel is presenting a problem is that of bringing our milk supply and the by-products of creameries under proper sanitary control. We are all familiar with the fact that these products have an important bearing on the prevalence of this disease among swine and calves. It is extremely unfortunate for the livestock owner who cleans his herd of tuberculosis, only to find them reinfected through the medium of their calves who contracted the disease by being fed on skimmed milk originating at creameries and which had not been properly pasteurized. I sometimes feel that this question has some bearing on the high percentage of tuberculous herds that your test reveals in various States.

My experience with the problems of this disease is very limited. I speak on the subject from a knowledge gained through being both a breeder of livestock and a meat packer. I fully appreciate the fact that in this field alone there is yet a great deal

for me to learn, and I am quite sure that the same is true in the field in which you men are working.

The success of this work depends upon each one of you, and I am sure it goes without saying that you are now doing, and will continue to do, your work well. Should carelessness, or inefficiency of any nature ever creep into the ranks of our sanitary forces, we shall not only lose all that has already been accomplished, but more important still, possibly unloosen the shackles from a plague that will continue to weaken further our economic fabric and add to the sufferings and losses in the human family.

Gentlemen, you are commissioned in an army that is going forward to give battle to the greatest enemy of civilization. Your generalissimo has the situation well in hand. Your leaders are generals of the best type. Their staff and line officers have won their stripes through practical experience, and every man serving on the front line, or in any other capacity has been thoroughly trained.

Your country is loyally supporting you and depending upon you. Your ammunition is the quarantine, the honest and sincere application of your scientific tests, and the proper disposition of all agencies of infection. The battle is on, and victory is the reward.

Breeder's Gazette says of scrub livestock: "Not only is there a fearfully expensive set of unprofitable boarders included in our livestock census, but there are vastly too many farms that are not yet even conditioned for the proper maintenance of livestock—either good or bad; all of which means that we have not yet bred up an established race of natural stockmen corresponding to the shepherds and herdmasters of Great Britain or the horsemen of the Perche. We have a start, to be sure. For the thousandth time we reiterate: Few farmers are rich enough to afford the luxury of scrubs around their places."

The last two horses of the London Fire Department were recently discharged from service with farewell ceremonies. The department is now provided with all motor equipment.

CLINICAL AND CASE REPORTS

(Practitioners and others are invited to contribute to this department reports of unusual and interesting cases which may be helpful to others in the profession.)

SYNOVITIS OF SHOULDER OR OF HIP OF THE HORSE ALLAYED BY DEEP HYPODERMIC IRRITATION

By JOHN W. ADAMS

*Professor of Surgery, Veterinary Department, University of
Pennsylvania, Philadelphia, Pa.*

SHOULDER LAMENESS in the horse is often a synovitis beneath the tendon of the biceps where it passes through the groove at the upper end of the humerus and just below the shoulder joint (intertuberal bursitis).

A hip lameness is often a synovitis beneath the tendon of the middle gluteus where it plays over the convexity of the trochanter major of the femur (trochanteric bursitis).

According to Hilton's Law, those nerves that supply the structures constituting a joint also send branches to all tissues covering the joint, so that stimulation of these branches reflexly produces cellular changes without and about the joint itself. Cutaneous nerves are extremely sensitive and blisters applied to the skin cause much pain and may leave permanent scars. In order to place the irritant closer to the inflamed synovial bursæ and thereby increase the efficiency of the treatment and incidentally to avoid the pain and possibility of blemish, I have for some years past been using for intertuberal and trochanteric bursitis a subdermal injection of a solution of iodine and potassium iodide. After considerable experimentation, I am prepared to recommend the following procedure: To one-half ounce of liquor iodi compositus (Lugol's Sol.) add one-half ounce of distilled water and five grains of potassium iodide; or to one ounce of distilled water add fifteen grains of iodine and thirty grains of potassium iodide. Cleanse the skin over the point of the shoulder or hip, lather and shave places the size of postage stamp where the needle is to be inserted.

On a shoulder I shave ten or twelve spots about two inches apart, the central spot being exactly on the point of the shoulder,

with the remaining spots distributed regularly on all sides of the central spot. Use a fine needle of 19, 20 or 21 caliber and at least an inch long. Apply twitch and hold up the opposite fore leg. Pinch up a fold of skin, pass the needle through the skin and when the subcutis has been reached turn the needle so that it stands vertical to the surface and press it in slowly but firmly till the point abuts against the surface of the biceps tendon, where it will stop. Inject 2 c.c. ($1\frac{1}{2}$ dram) at each point. Over the point of the shoulder the tendon is near the surface and here the needle will not penetrate far, but around this point the needle will pass deeper, at some points to its full length. There is no danger with an inch needle of puncturing the shoulder or the hip joint, nor would harm be done if the joint were entered and injected.

After depositing 2 to 3 c.c. at each of the 12 or 15 places some 2 to $2\frac{1}{2}$ inches apart, smear the injected area with cosmoline or vaseline.

After injection the patient may be turned into a loose box. He need not be tied up or put on pillar reins, because he will not rub or bite the part. In 24 hours the injected area will be swollen and hot. Iodine in this strength ($2\frac{1}{2}$ per cent) will not cause necrosis.

For trochanteric bursitis, the central point is the center of the great trochanter, directly over the middle of the tendon of the middle gluteus muscle. The procedure is the same as for the shoulder.

Two weeks later, if some lameness remains, the procedure may be repeated at points between those marking the previous injection.—(*From the Veterinary Extension Quarterly, No. 5, Jan. 7, 1922, p. 3.*)

FORAGE POISONING ¹

By W. A. ANDERSON

Sleepy Eye, Minn.

IN BEGINNING I might say that I have selected a topic for discussion that is more or less familiar to most of us, but still a disease about which little is as yet known.

¹ Presented at the annual meeting of the Minnesota Veterinary Medical Association, St. Paul, Minn., January 13-14, 1922.

During the late Fall and early Winter we have learned to know, in my locality, of what great economic importance forage poisoning really is, and I think I can say conservatively that the loss in livestock in Brown and Redwood Counties in the past three months will amount to many thousands of dollars.

This malady was first recognized about 100 years ago, and since that time has been known by a number of different names, some of which are head disease, fever of the nerves, cerebro-spinal meningitis, sleepy staggers, Borna disease, Kansas horse plague, botulism, and forage poisoning.

I think forage poisoning the best fitted and the most understandable name for this malady, although it is understood that the forage itself is not poisonous but is merely a carrier of the toxin.

On the morning of October 25, I was called in the country to see some cattle that the owner said had eaten too much corn, and upon arrival I found one cow dead, one stretched out flat upon the ground groaning and grinding its teeth, and a third lying in a natural upright position but unable to rise. Upon questioning the owner I was informed that these cows appeared in perfect health the evening before and gave their usual amount of milk. By noon the same day these three cows were dead and a fourth was down.

The symptoms manifested were as follows: Animals appeared very nervous, walked about with a trembling, staggering gait, soon lying down, and in a short time unable to rise. After an hour or so muscular twitching was noticed, mostly about the head, neck and shoulders. In an hour or two more the animals were stretched flat upon the ground; respiration labored, pulse fast, temperature normal, glassy expression of the eyes and a watery discharge from nose and mouth. There was some bloating shortly before death, which took place in from six to ten hours.

The postmortem examination showed petechial hemorrhage in heart, lungs and under surface of ribs. The subcutaneous tissue in the region of the throat and shoulders showed areas of congestion.

Treatment.—As a preventive cattle were kept from stalk fields and were fed grain and hay in the barnyard. It is my experience that the treatment of these acute cases with medicine is ineffective and useless.

Three herds were treated with botulinus antitoxin. In one herd a cow died from this disease two weeks after treatment. In the other two herds no sickness or death occurred, but these cattle were not allowed to feed in the stalk fields after treatment, therefore the results I have had from the use of the antitoxin is quite indefinite.

No poisoning occurred among horses on these farms.

RECTANGULAR MOUNT HYPODERMIC NEEDLE FOR SUBCUTANEOUS INJECTION OF CATTLE

By E. M. NIGHBERT

United States Veterinary Inspector, London, England

THIS NEEDLE, shown in the accompanying illustrations, has solved many of the difficulties for men in injecting large herds of cattle in applying the tuberculin test. Its use makes the work quick, safe and practicable to inject in the region of neck or shoulder, where the injection should be made, in order to observe the point of injection to better advantage.

The needle should be strong, sharp, large bore, and not more than one-half inch long from its shoulder.

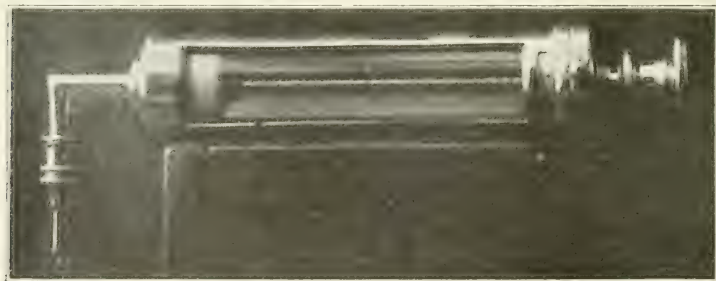


Fig. 1.—Rectangular mount hypodermic needle for subcutaneous injection of cattle

By use of the rectangular mount needle it is not necessary to pick up the skin in making the insertion. Simply thrust the needle straight through the skin, slightly lifting plunger-end of syringe, making injection with left hand. No matter what movement the animal may make, the operator always has full control in making the proper and a safe injection, no matter how tough or thick the skin, or how great the sensibility of the animal.

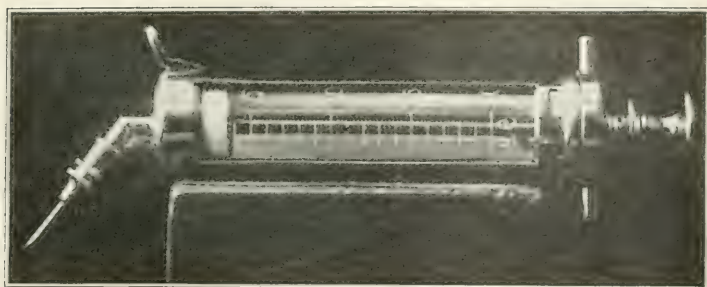


Fig. 2.—Modified mount hypodermic needle for subcutaneous injection of cattle

It is quite evident that when operators resorted to making injections of tuberculin in the region of the udder or coccyx it was for the purpose of avoiding as many difficulties as possible and making the work more convenient and pleasant, which are great advantages in treating large herds. With the rectangular and modified mount hypodermic needle it is now a pleasure for me to inject cattle of various dispositions and under varied conditions of poor light and poor assistants, compared with the use of the ordinary equipment.

ADVANTAGES OF THE RECTANGULAR MOUNT NEEDLE

The fingers are in contact with the needle near its point, which keeps it in proper position at all times, and the sensation of it passing through the skin is perceptible, which assures that the needle is in proper place and position for making the injection.

The danger of breaking needles or syringes is practically eliminated, simply be-

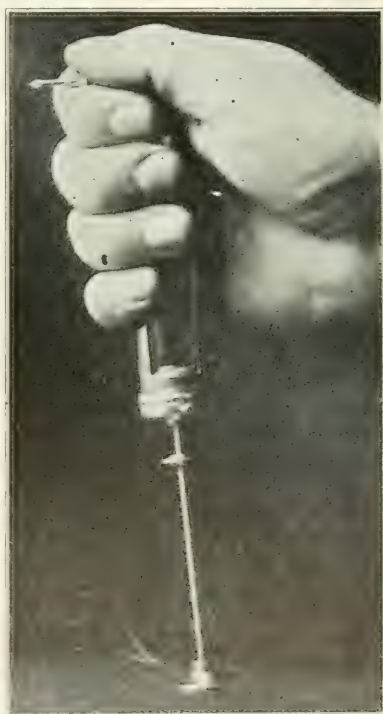


Fig. 3.—Proper position of rectangular mount needle for making injection

cause one has the syringe in his hand under full control and protection, instead of holding it with the thumb and two fingers, as is the case with the ordinary hypodermic needle used for subcutaneous work.

PRELIMINARY NOTE ON A NEW SPECIES OF GONGYLONEMA FROM AMERICAN SWINE

By EDWARD A. CHAPIN

*Junior Zoologist, Bureau of Animal Industry, U. S. Department
of Agriculture*

In examining specimens of various species of nematodes from domesticated animals, I have noticed that the species of *Gongylonema* from *Sus scrofa domestica* in the United States is not the same as that reported from this host in Europe. The worm is quite common in the pig in this country and in order that the literature may not be further confused, a name is hereby given to it.

Gongylonema ranšomi n. sp.: Elongate, thin worm burrowing in the mucosa of the esophagus and tongue of the pig, similar in appearance to *Gongylonema scutatum* of cattle. Differs from all species of the genus except *G. verrucosum* by having spicules 10.3 mm. long, and from the latter by the lack of the dorsal ala.

Type: U. S. N. M. Helminthological Collections No. 24695.
Paratypes: U. S. N. M. Helminthological Collections No. 25047.

The type material was collected at East St. Louis, Missouri, in May, 1921, by Dr. J. S. Jenison. A complete description of this worm will be published in the Proceedings of the U. S. National Museum.

TESTIMONIAL TO PROF. PERRONCITO

Former pupils and colleagues of Prof. E. Perroncito are preparing to present a testimonial to that illustrious Italian parasitologist in view of his approaching retirement because of age. Foreign scientists are invited to have a part. Subscriptions may be sent to Prof. Faelli, chairman of the executive committee, at the University of Turin.

ABSTRACTS

THE FIGHT AGAINST TUBERCULOSIS IN CATTLE IN THE UNITED STATES. THE ACCREDITED HERDS. L. Panisset. *Rev. Gén. Méd. Vét.*, vol. 30 (1921), no. 357, p. 505.

Panisset gives a brief history of the establishment and work of the Tuberculosis Eradication Division of the United States Bureau of Animal Industry, describing in particular the accredited herd plan. The eradication of tuberculosis by districts is also discussed; the results of the test in a county in Mississippi are stated.

In conclusion the author says that up to the present time, only four years since the beginning of the campaign, we are still only in the experimental stage. Several thousand herds are free from tuberculosis, it is true, and breeders have eagerly sought the accrediting of their herds, but will this plan continue to tempt the owners for a long time to come? To be fruitful and to realize the goal, the fight ought to be prosecuted without relaxation; any let-up may mean a recoil in the progress already made. The Bureau of Animal Industry is strongly organized and its policy is one of perseverance; but the eradication of tuberculosis demands a financial effort on the part of the State which may well cause one to fear lest it should not be sustained. Already Congress has appropriated recently a fund of \$1,500,000, directing that \$1,000,000 should be devoted to the payment of indemnities and \$500,000 should be reserved for carrying on the actual operations.

The eradication of tuberculosis is a titanic work, the accomplishment of which should be gratifying to the American genius. If the eradication is not realized, the work will help to make the herds healthy and this will be for the greatest good of rural hygiene and the public welfare.

L. T. GILTNER.

SALOL IN THE TREATMENT OF AVIAN CHOLERA. E. Huynen. *Annales de Méd. Vét.*, 1921, pp. 286-287.

In acute cholera, give directly to the sick birds 20 to 40 cgm. a day (3 doses). For those birds that still appear well, mix the salol into a mash of bran or bread, or in water or milk. With

this treatment there was often observed an arrest of the epizootic of cholera in 3 to 4 days. In subacute cholera, which is generally accompanied by enteritis manifested by diarrhea, and also in white diarrhea of chicks, in which there is often a gaseous indigestion, the following mixture is used: 1 teaspoonful for 10 chicks, and three times that dose for grown fowls; salol 5 gms., powdered wood charcoal 20 gms. This treatment is continued for at least 10 days after the disappearance of the last case of the disease.

L. T. G.

STUDIES ON EXUDATIVE SEPTICEMIA OF GEESE. R. Reinhardt.
Zeitschr. f. Infekth. etc. der Haustiere, vol. 21 (1921),
No. 4, p. 257.

Material from outbreaks of this disease, which has occurred regularly each year in Mecklenburg, were obtained in 1913-14 for study. The affection appears in May and early June, and again in late August and September. Young geese are chiefly affected, although older birds are often attacked. The mortality among the young is 70 to 90 per cent. Only geese are spontaneously affected; other water fowls and chickens, pigeons and other domestic animals are not affected. The duration of an outbreak is about 2 to 4 weeks.

Symptoms.—Loss of appetite, ruffled plumage, great weakness, frequent sitting down, staggering, emaciation, diarrhea, bright whitish grey, thin and watery droppings. Sometimes edematous swellings of the legs; duration of sickness about 2 to 5 days; incubation period not definitely known; artificial incubation is about 12 hours; death in 24 hours, sometimes 48 to 72 hours, and exceptionally 5 days.

Post-mortem findings.—Skin and subcutis reddened, vessels congested, sometimes small hemorrhages in subcutis and muscles; in body cavity and air sacs there is a cloudy, sero-fibrinous exudate varying in amount from a very little to a considerable; sometimes organs adhere to neighboring parts by the fibrinous exudate; liver and spleen enlarged; mucosa of small intestine thickened and reddened, sometimes hemorrhagically inflamed; causative agent is a small fine rod 0.3-1 micron long, 0.1-0.2 micron broad. Gram negative, non-motile, no spores, grows best on serum or blood medium; sometimes not at all on plain agar; the

growth on solid media is delicate; not hemolytic, no growth in bouillon, lactose or glucose broth; no change in milk. It is killed at 55° C. for 30 minutes.

Geese may be artificially infected by injection and sometimes by feeding, but not by exposure to sick birds. Ducks were infected by injection but not by feeding. Hens, pigeons, sparrows, white mice, rats, rabbits and guinea-pigs could not be infected.

No agglutinins were demonstrated in blood of birds injected with killed cultures, or those that were sick with the disease. No immunity was observed in geese injected intramuscularly with doses of 1 to 2 c.c. of killed cultures in suspension in normal salt solution.

Measures for controlling the disease consist in separating healthy from the sick and suspects, cleaning up and destroying droppings, and disinfection of houses, etc.

L. T. GILTNER.

BOVINE APHTHOUS FEVER (FOOT-AND-MOUTH DISEASE) IS NOT TRANSMISSIBLE TO MAN; HUMAN APHTHOUS STOMATITIS IS NOT TRANSMISSIBLE TO BOVINES. Ch. Lebaillly. *Compt. Rend. Acad. Sci. (Paris)*, vol. 172, May 2, 1921. (Abs. in *Rev. Gén. Méd. Vét.*, vol. 30, Sept. 15, 1921, p. 531.)

Notwithstanding the belief by physicians and veterinarians that aphthous fever is transmitted from animals to man by means of milk, Lebaillly has not found a single case of human aphthous fever among numerous persons who were in contact with sick animals. Aphthous eruptions have been reported in Normandy in the absence of aphthous fever. A man affected with a severe aphthous eruption had received his milk for several years from a single farm on which the cows were free from aphthous fever. Attempts to transmit human aphthous stomatitis to bovines by subcutaneous inoculation gave negative results. Negative results were also obtained from efforts to transmit bovine aphthous fever to man by subcutaneous and intramuscular inoculation and by combining subcutaneous injection with exposure to aphthous virus for five minutes in contact with the internal surface of cheeks presenting slight erosions. "It seems legitimate to conclude from these observations and experiments," says the author, "that bovine aphthous fever and the aphthous stomatitis of man are absolutely distinct diseases."

ACTIVE IMMUNIZATION AGAINST FOWL CHOLERA. R. Manninger.
Dent. Tierarzt. Wochn., jrg. 29 (1921), No. 43, p. 543.

Immune serum usually affords only a transient protection (6 to 8 days) against fowl cholera and is of value only in cases where a passive immunity of short duration is sought. Manninger prepared a vaccine from a culture of an avirulent strain of the fowl cholera bacillus, with which he was able to secure a marked degree of immunity without causing appreciable local or general disturbances in the vaccinated birds. The vaccine was made by suspending the washed off growth of agar cultures in sterile physiological salt solution. The suspension was prepared so that each c.c. contained 5 mg. of bacteria, and the dose for hens was 1 c.c., and for ducks, geese and turkeys 2 c.c.

The vaccine was tried on a large number of birds and with few exceptions proved very satisfactory. The mortality from cholera in outbreaks in previous years has ranged from 80 to 90 per cent. Following the vaccination the losses were reduced to less than 10 per cent.

L. T. GILTNER.

TICK PARALYSIS. Sydney Dodd. Jour. Comp. Path. & Ther.,
vol. 34 (Dec., 1921), part 4, pp. 309-323.

In Australia *Ixodes holocyclus* Neum. "is capable of producing a very fatal form of paralysis in animals, the main feature of which is a progressive motor paralysis." Dodd succeeded in the experimental transmission of the disease by placing *I. holocyclus* on animals. A guinea-pig became paralyzed and died on the sixth day. A dog showed symptoms of paralysis on the eighth day and died on the ninth.

Tick paralysis seems to be common in animals on the coastal scrub areas of eastern Australia. Cases have been reported in man, cattle, horses and dogs. Dodd reports a case in a bandicoot which was brought to his laboratory. The animal died of paralysis five days later. Besides the symptoms of ascending motor paralysis, there were attempts at vomition, continual stretching and yawning, and coma just before death.

"In commenting on a similar condition in America due to *Dermacentor venustus* Nuttall and Hadwen consider that the condition described by them is due to a toxin manufactured by the tick, and explain the apparent period of incubation by con-

sidering that the toxin is not injected into the host until the period of rapid engorgement has been reached. This may be the correct explanation as regards *I. holocyclus* also, but before finally accepting such a view, further research work is necessary."

Attempts to demonstrate an infective organism in the blood and cerebro-spinal fluid of affected animals failed. Supporting the toxin hypothesis, Dodd's cases took six days or over to develop. (The time taken for complete engorgement in ticks is influenced in some cases by fertilization, as females will not engorge fully until they have been impregnated by the male.—Reviewer's note.)

"The fact that if ticks are removed before symptoms set in, although they may have attached for a day or two, no paralysis results, can be used as an argument in favor of either hypothesis, viz: (1) living virus or (2) venom." Immunity is the rule after tick paralysis.

"Prior experimental work on tick paralysis has been successfully carried out by Hadwen and Nuttall. The present article deals only with the condition in Australia."

S. HADWEN.

EPIZOOTIC RABIES DISSEMINATED BY BATS AMONG CATTLE IN SANTA CATHARINA, SOUTH BRAZIL. H. Haupt and H. Rehaag. Ztschr. f. Infektkrkh. d. Haustiere., vol. 22 (1921), p. 104.

Since 1908 an epizootic raged in Santa Catharina which killed 30 per cent of the cattle and 15 per cent of the horses in certain localities. The pathological picture was the same for horses and cattle; *i. e.*, progressive paralysis involving the locomotor and digestive systems, with cerebral disturbance, ending fatally in 4 to 8 days. Autopsy and bacteriological examinations of fatal cases were negative. Diagnosis of rabies was established by finding Negri bodies, substantiated by inoculation tests on laboratory animals. The disease appeared as dumb rabies; there were enormous losses of cattle in regions free from rabid dogs. That the disease was spread by land animals was wholly improbable because (1) fatalities were greatest near woods and fewest in thickly settled regions; (2) the disease ap-

peared simultaneously on both shores of an impassable stream. In the affected districts bats have been seen flying by day. The abnormal behavior is believed to be due to their affection with this disease. A carefully guarded 8 day-old calf was bitten by a day-flying bat, and after 27 days became affected with typical dumb rabies. In a second day-flying bat captured in the act of biting a cow, rabies was established by rabbit injection. Cattle bitten by rabid dogs in the same neighborhood develop furious rabies. Well built stalls which can not be entered by bats are suggested for the protection of cattle.

W. N. BERG.

TREATMENT OF WOUNDS BY MEANS OF IODIN FUMES. Hébrant and Antoine. *Ann. Méd. Vét.*, Feb., 1921, p. 49. (Abs. in *Rev. Gén. Méd. Vét.*, vol. 30 (Sept. 15, 1921), p. 532.)

The authors have found the fumes of iodin, for use in the treatment of wounds, as proposed by Louge in 1911, to possess all the properties of tincture of iodin and to have the enormous advantages of being noncaustic and painless and permitting the treatment of wounds without dressing. The product used in generating the iodin vapors is iodoform, a very unstable product, which, under the action of moderate heat, is decomposed and gives off violet vapors of nascent iodin. These fumes projected on the wound, cover it with a thin antiseptic coating.

Since 1912, this method has become classic at the small-animal clinic of the Belgian Veterinary School at Cureghem. All accidental and operative wounds and open fractures have been treated with success by this process. Only in the case of wounds extending over a large surface is the treatment not indicated, because of the possibility of toxic effects from the absorption of iodin.

The application of the treatment is very easy, and several methods are at the service of the practitioner, among them the following:

- (1) A tuft of cotton sprinkled with iodoform is burned and the released vapors are directed on the wound.
- (2) Iodoform is introduced into a glass pipette at the wide end; the middle of the tube is heated gently, and the

vapors are directed on the wound from the slender end by the operator, who blows from the other end.

(3) An apparatus for applying the fumes is composed of a receptacle for holding the iodoform, closed by a screwed cover and provided with two tubes on opposite sides. One of these tubes is directed toward the wound and gives passage to the iodine fumes obtained by heating the receptacle. A rubber bulb attached to the other tube serves to blow the fumes out.

The fuming may also be accomplished by means of the cupping-glass and the thermo-cautery. The heat of the cautery decomposes iodoform sprinkled on the wound.

NEUFELD ON TUBERCULOSIS IMMUNIZATION

Professor Neufeld, director of the Berlin Institute for Infectious Diseases, recently published in the *Zeitschrift für Tuberkulose* an excellent critical survey of the prospects of specific tuberculosis therapy. His paper is reviewed by the Berlin correspondent of the *Journal of the American Medical Association* (Nov. 19, 1921, vol. 77, p. 1669). Neufeld concludes with the statement that in all attempts at immunization against tuberculosis a limit is set beyond which we can not go: "Let us not forget that in all forms of immunization we are only imitating Nature, which causes antitoxins to appear in the blood of a diphtheria convalescent and bacteriolytic substance in the serum of a cholera patient. To one who has recovered from smallpox or measles, Nature grants an immunity that often lasts his whole life through, but to the patient who has recovered from tuberculosis she denies this boon. He who sets for himself the goal, as many investigators persist in doing, of an immunizing process in tuberculosis comparable with that of smallpox is looking for something that does not exist."

As the outcome of the Second International Congress on the History of Medicine, held in Paris last summer, an International Society of the History of Medicine has been formed, with headquarters at Paris. The object is to unite persons interested in the history of the healing art, including physicians, veterinarians and pharmacists. The next congress will be held in London, July 17 to 22.

REVIEW

THE TOPOGRAPHICAL ANATOMY OF THE LIMBS OF THE HORSE.
O. C. Bradley. W. Green & Son, Limited. Edinburgh,
1920.

This book is one of the Edinburgh Veterinary Series issued under the editorial supervision of Dr. O. Charnock Bradley, Principal of the Royal (Dick) Veterinary College. It contains xi + 172 pages and 115 illustrations, and is somewhat more comprehensive than one might anticipate from the title, since it includes a considerable amount of systematic description and brief instructions for the dissection of the parts dealt with. We have learned confidently to expect good, substantial material in any publication from Professor Bradley's pen, and the present volume is further justification of our assurance in this respect.

The figures are without exception clear and sufficiently large to enable one to make out all details without difficulty. The arteries and veins are colored in the illustrations of dissections and sections. The author has been more fortunate than most veterinary writers in having at his disposal the artistic skill and accuracy of so eminent an anatomical illustrator as Mr. James T. Murray, who is best known to most of us through his excellent drawings in Cunningham's Anatomy. The standard of illustrative work is in general still regrettably low in most of our veterinary publications in English, and it is sincerely to be hoped that in the future we may have more of the type created by such artists as Mr. Murray. It is unfortunate, as the author explains in the preface, that the artist's instructions respecting the reduction of his drawings were not followed in a number of cases. Such neglect on the part of the block-makers is of course most annoying to author and artist, although the effect may not even be noticed by the average reader in most cases. But one might reasonably expect even a blockmaker to observe the disparity between figures 5 and 6. Some of the drawings—that reproduced in figure 8, for example—would doubtless have gained in artistic quality by further reduction, but on the other hand the reduction has in no case been carried so far as to destroy the clearness of the illustration.

With regard to the text the author is to be congratulated on his unusual ability in making it both brief and sufficient. The brevity of the descriptive matter will appeal strongly to the advanced student and to the practitioner who often wishes to refresh his memory on certain anatomical points in rather a hurry. He therefore appreciates concise statements and values, still more clear illustrations which assist strongly in enabling him to recollect anatomical details which are not as definite as they need to be for the business in hand. The lack of descriptions and illustrations adapted to practical requirements in much of our veterinary anatomical literature probably accounts in great part for the fact that veterinarians do not consult such works as much as their confrères in human practice do. The simple fact is that the information required is often given in such a vague form that it has little or no practical value or is scattered about in such a way that it is difficult for a busy man to assemble the data into usable shape.

The reviewer admires Dr. Bradley's courage in using the revised nomenclature throughout. This may interfere in some degree with the utility of the book among practitioners who grew up academically in the appalling jumble of names which still pervades most of our literature. But Professor Bradley is evidently looking forward and has adopted this course as the one which will eventually lead us out of the wilderness. In this connection the etymological footnotes will be very useful to the increasingly large number of students who know little or no Latin and no Greek.

Differences of opinion on certain points are inevitable. The reviewer is opposed to the use of the word "matrix" to designate the "corium" in the foot. It connotes a misapprehension and is almost as objectionable as the term "keratogenous membrane." The "stratum germinativum" might be called instead the "matrix" of the hoof without impropriety, since it moulds the corium embryologically and produces the hoof. It also seems undesirable to use the term "latus" with reference to parts of the corium, since it designates the "flank." There appears to be a slip of the pen with regard to the gender of "rete."

The reviewer regrets that Dr. Bradley did not see fit to provide some figures and descriptive matter relative to the superficial topography of the limbs, even if this had involved exclu-

sion of some of the systematic material. He has felt for years that careful study of the living subject by inspection and palpation is a very important part of anatomical training, bridging the gap between the dissecting room and the clinics. This method is well established in human anatomy and excellent figures and descriptions are available for its pursuit. It is highly desirable that a similar condition should exist in veterinary anatomy.

In conclusion it is a pleasure heartily to commend Professor Bradley's book to the veterinary student and practitioner, and to others interested in the horse for other reasons, as one of the most concise and accurate contributions to our knowledge of equine anatomy. We hope that other volumes will soon appear, until we have a complete account. S. S.

DISEASES OF ANIMALS IN SOUTH AFRICA. By C. R. Edmonds, M. R. C. V. S., Assistant Chief Veterinary Surgeon, Rhodesia. Published by Ballière, Tindall and Cox, London, 1922.

This publication consists of 477 pages, with 35 illustrations, and the subject matter is arranged as follows:

Part I—Diseases Caused by Vegetable Parasites.

Part II—Section 1—Diseases Caused by Animal Parasites.

Section 2—Diseases Caused by Insects.

Section 3—Diseases Caused by Worms.

Part III—Diseases Caused by an Ultra-Visible Virus.

Apparently the author has produced a little book intended to give the practitioner a general survey of the diseases found in South Africa and a brief description of such diagnostic and therapeutic measures as are found essential in that country. In his preface the author states:

"The admirable works dealing with animal diseases in other parts of the world, and to which we in South Africa are greatly indebted, do not treat the diseases peculiar to this sub-continent in the manner, if at all, in which they have been chronicled from actual experience in this country by a number of veterinary surgeons and other writers in our agricultural press."

The author has displayed a discerning knowledge of the subjects and one cannot fail to be impressed by the manner

of presentation. The book throughout is distinguished by a pleasing simplicity and conciseness.

The printing, binding and general make-up reflect credit on the publishers, and in all, it is regarded as a useful little volume which should prove of value to veterinary practitioners, students and livestock owners, especially in South Africa.

U. G. H.

The number of students in attendance at the Royal (Dick) Veterinary College, Edinburgh, Scotland, during the session of 1920-21, according to the report of the Principal, Dr. O. Charnock Bradley, was even greater than during the preceding session, when it was unusually high. Candidates to the number of 161 presented themselves for the several examinations leading to M. R. C. V. S., and of these 74 per cent were successful, 20 obtaining honors.

Dr. Royal S. Copeland, Commissioner of Health, New York City, in a leading article in *Milk Reporter* says of the London milk supply: "There is sold in the city of London not a single drop of milk that would be permitted to be sold in New York City, even for cooking purposes. Over 10 per cent of the samples submitted contained tubercle bacilli, the germs of dread tuberculosis. When I explained to Lord and Lady Astor the significance of these bacteriological examinations they were shocked beyond measure."

Dr. Eugene Ferron arrived in the United States last month, having completed his contract at Guayaquil, Ecuador. He states that the Government there decided to discontinue the experiment station because of lack of funds. There was little money for the work last year, and the Animal Industry Department of the station was never started. Dr. Ferron's health has been poor for the past few months, so he decided to return to Philadelphia, Pa., and try a change of climate. As soon as he recuperates he expects to return to South America with a shipment of purebred stock for Ecuador.

ARMY VETERINARY SERVICE

NO AMATEURS WANTED

With reference to the issue of medical supplies to stable sergeants and possibly other noncommissioned officers of the line of the Army for the treatment of minor injuries to animals to be included in a wallet to be designated as "farrier's wallet," the surgeon general of the Army is forced to place himself on record as absolutely opposed to such issue to non-technical troops. He would take precisely the same position if it were proposed to issue medical supplies to the first sergeant of each unit for the treatment of minor injuries of men. His objection is based on the fact that a veterinary service, commissioned and enlisted, is now available throughout the Army for the care of sick animals precisely as such service is available for the care of sick men. Veterinary personnel is assigned to every station of any consequence and will be available with every regiment and larger unit in time of war. So far as known, it has never been proposed to attach medical personnel or to furnish medical supplies to units smaller than the regiment such as the company or troop. Under present conditions practically no sick or injured animal need lack the professional care of a veterinary officer and his trained enlisted assistants. It is stated:

The surgeon general confesses to a lack of sympathy with a proposal which encourages the practice of veterinary medicine by sergeants of the line under any circumstances. The Army can not, in his opinion, afford to develop and maintain a group of amateur horse doctors whose activities have in the past tended to discredit the science of veterinary medicine and will doubtless so continue in the future. The treatment of minor injuries is not a minor matter, because such conditions frequently result in prolonged disability and loss of life. Minor injuries are as much within the province of the veterinary officer as major ones. If the stable sergeant is to be equipped for this treatment there is no limit to the scope of his pseudo-professional activities, and, it should be noted, he serves under the instruction of the unit commander, entirely independent of the veterinary service, which by regulation is responsible for the care of sick animals. Without doubt the stable sergeant occupies a broad field of usefulness, in which much remains to be accomplished, without taking over the treatment of injured animals. The care and hygiene of normal animals is a most important

matter in which he, under the unit commander, can render most excellent service in keeping animals physically fit. No one else can do this work. It is vastly more important to keep animals well than it is to cure them after they are injured. It would seem that the best and most useful development of the stable sergeant's activities would be in this direction and that time and materials spent by him in treating the sick would be worse than wasted. In conclusion, the surgeon general urgently recommended the abandonment of the proposal to issue a packet of medical supplies to line sergeants, confidently believing that the first-aid packet to be developed and supplied every animal, together with the veterinary service now available, will meet every reasonable requirement.—*From Army and Navy Register.*

MEAT AND DAIRY HYGIENE SCHOOL

The following is a list of officer students and commissioned instructors in the Veterinary School of Meat and Dairy Hygiene, General Intermediate Depot, Chicago, Ill.:

Students: Capt. Jos. N. Hornbaker, V. C.; 1st Lieut. Joseph H. Dornblasser, V. C.; 1st Lieut. Raymond T. Seymour, V. C.; 1st Lieut. Samuel G. Kielsmeier, V. C.; 1st Lieut. Robert P. Kunneke, V. C.; 1st Lieut. Howard N. Beeman, V. C.; 2nd Lieut. James L. Barringer, V. C.

Instructors: Capt. H. S. Eakins, 1st Lieut. H. J. Juzek.

Officer in Charge of Instruction: Major George A. Lytle.

Commandant: Colonel Arthur Johnson, Inf.

Maj. Andrew E. Donovan, in addition to duties in office of surgeon, 1st corps area, Boston, will render veterinary service at Boston quartermaster intermediate depot, relieving 1st Lieut. Arthur D. Martin, who will proceed to Fort Niagara, N. Y., for duty as station veterinarian.

The editor has received a note from Dr. Olaf Schwarzkopf, Major, U. S. Army, retired, who is now visiting Coblenz, Germany. He and his wife left New York by steamer on November 10, 1921, arriving at Antwerp, Belgium, November 20, and then proceeded by railroad to Coblenz. He has already found many old friends among the officers stationed at that point. He and his wife are located in a "pension" in a country hotel

within a few minutes ride by railroad to the city. All around them are old "Burgs" of the Middle Ages and even foundations of ancient Roman castles. They get their drinking water for the hotel from an old Roman well in the rear of the building.

Major George Lytle, in charge of the Animal Food Inspection for United States Army at Chicago, was called to Washington recently to testify as an expert witness in a suit involving a contract for a large amount of bacon.

Lieutenant W. R. Wolf of the Army Veterinary Corps, and Miss Marie McCormick of Little Rock, Arkansas, were married at Little Rock on December 31.

Lieutenant and Mrs. Wolf have left for the Lieutenant's new station at Honolulu, Hawaii, where they will be at home to their friends after April 1.

Captain H. S. Eakins of the Army Veterinary Corps and instructor at the School of Hygiene and Meat Inspection, Chicago, was married on March 2 to Miss Marcelia Kinkade. Miss Kinkade was chosen "Queen of the Pageant of Progress" that was held last summer in Chicago.

A French army veterinarian has proposed that in the erection of war monuments the services of the horses and mules be recognized by placing a statue of a horse on the heights of Verdun and one of a mule on Hartmann peak in the Vosges Mountains. He quotes a French soldier-author who has written: "The battle of Hartmann was a combat of the mule against the railway. If a monument is ever erected on Hartmann, it should be a symbolic statue of a mule." It is said that in England a fund of 150,000 pounds sterling has been raised for erecting at London a monument to the memory of the 340,000 horses of the British army killed in the war.

ASSOCIATION NEWS

VETERINARY MEDICAL ASSOCIATION OF NEW YORK CITY

The regular monthly meeting of the Veterinary Medical Association of New York City was held in the Veterinary College building, New York, on December 7, at 8.30 p. m. President MacKellar presided. The minutes of the November meeting were read and approved.

Dr. John Payne Lowe, Passaic, New Jersey, read an excellent paper on State and Municipal Milk Control.

The doctor said that milk, one of the cheapest and most important foods for infants and invalids, was the most difficult to handle and transport without contamination. It should have its inception in a healthy cow. The problem is largely an educational one and the veterinarian from his training and interest, should counsel and assist the dairymen in his territory in the production of clean milk. He should be advised that it pays to be up to date in the installation of proper equipment and sound sanitary arrangements, and to have his cows regularly inspected and reactors eliminated. Milk laws should be enforced to prevent fraud and misrepresentation. Milk ordinances at the present time, vary too much. They should be more uniform in the various municipalities, made free from petty annoyances and thoroughly enforced without favor by the inspectors. The doctor considers that not enough weight has been given to the human element in the production of clean milk, and said the product of the most carefully conducted and sanitary dairy could be contaminated by a careless or dirty milker.

In the production of clean milk, eight factors had to be considered, (1) medical inspection of attendant; (2) physical examination of cows for udder and general diseases; (3) tuberculin test; (4) the water supply; (5) privies and manure receptacles screened; (6) cows thoroughly cleaned and milkers wash hands after milking cow; (7) utensils sterilized; (8) milk cooled to proper temperature promptly. Dairy barns should be constructed so as to be easily disinfected with abundant sunlight wherever possible. Separate calving pens should

be provided with maximum comfort for the cow. This paper produced a lengthy discussion by Drs. McKim, Beans, and DeVine.

The next speaker was Dr. John DeVine, who gave a splendid report of the U. S. Livestock Sanitary Association meeting, the Tuberculosis Conference and the Illinois Veterinary Medical Association—all recently held in Chicago. Under case reports Dr. Mulcahy reported on a mongrel terrier, four years old, which had not passed feces or urinated in ten days. The doctor had given him castor oil, arecoline, jalap, compound cathartic pills, high enemata, exercise, etc., with no results. The consensus of opinion was that the dog was suffering from intestinal stasis or possibly a foreign body in the stomach or intestines. The Secretary read a letter from Dr. Robert Dickson, Little Silver, N. J., reporting a case of what he thought was osteoporosis in a four-months old Airedale terrier. None of the members present could report having seen bighead in dogs.

Dr. Victor Carabba and Dr. Frank Weirboar were unanimously elected to membership in the association.

This being the annual meeting, the reports of all committees were next in order. Dr. Clayton, Chairman of the Board of Censors, reported progress.

Dr. Berns, Chairman of Program Committee, said that they had succeeded in securing several good men as contributors to the program during the past year.

Dr. McKenney, Chairman of Prosecuting Committee, said they were investigating the case of two illegal practitioners.

The accounts of the Secretary-Treasurer having been audited by the Auditing Committee, he reported a balance in the treasury of \$125.17. This report was accepted.

The election of officers for the ensuing year then took place and resulted as follows: Dr. Robert S. MacKellar was unanimously reelected President; Mr. William J. McKinney was unanimously reelected Vice-President; Dr. J. E. Crawford was elected Secretary-Treasurer. The following five gentlemen were elected to serve as censors: Dr. Charles E. Clayton, Dr. C. G. Rohrer, Dr. Bruce Blair, Dr. C. W. Shaw and Dr. Edward A. Durner.

Dr. Berns announced that a memorial meeting would be

held in the College on December 12, in honor of the late Dean Hoskins.

It was regularly moved, seconded and carried that a hearty vote of thanks be extended to Drs. Lowe and DeVine for their valuable contributions to the program of the evening. No further business appearing, the meeting adjourned.

The January meeting of the Association was held in the Veterinary College building on January 4, 1922. President Robert S. MacKellar presided. The minutes of the December meeting were read and approved.

A general discussion on cribbing and windsucking, led by Dr. George H. Berns, was taken up. Dr. Berns recited the case of the race horse, Playfellow, which was recently causing a sensation in the newspapers. He said that cribbing and wind-sucking had been recognized for centuries and had been discussed by all the old writers on veterinary literature. He himself had always been skeptical about a horse being able to suck wind, and that in his experience of 36 years as a veterinarian, he could not recall a case of flatulent colic due to windsucking. As this vice was chiefly confined to the lighter types of horses, and since his experience was chiefly with the heavy draught horse, he would be interested in the views of men who attended to the Thoroughbred, Standardbred and light delivery horses. He stated that from an anatomical and physiological standpoint, it was practically impossible for a horse to swallow air in any appreciable quantities, that the grunting sound made in cribbing was due to the horse expelling gas from the stomach, rather than swallowing air.

Dr. C. W. Shaw said, in his opinion, there was no question but that a horse can suck wind in large quantities, when he learns the vice, and said he could cite dozens of cases of flatulent colic he attended to that were directly due to windsucking and that when a cribbing strap was worn there was no bloating.

Dr. McKinney said that he believed cribbing was due to habit and in a majority of cases to toothache in the incisor teeth. He had treated a number of cases of cribbing by cocainizing and scarifying the gums of the upper and lower incisors. In the majority of cases this method was successful. He said he sometimes applied a snug fitting muzzle with success.

Dr. Slawson said he himself can swallow air and that he can see no reason why a horse can not acquire the same habit. He believes the air is swallowed with the saliva which a cribbing horse produces by stimulation of the salivary glands.

Dr. Reid Blair said that gum chewers swallowed air with their saliva, and that if horses did swallow air he thought the air would be an aid to digestion, rather than a hindrance, but that in his opinion, a horse could not swallow air in appreciable quantities.

Dr. Ackerman said he had seen only two horses that could positively swallow air, and that in these cases, he believed it was due to a paralyzed or anatomical change in the throat.

Dis Gannett, DeVine, Fleischman and McKim also joined in the discussion.

Dr. E. B. Ackerman recited the case of a Boston terrier bitch, 5 years old, which came in season about August 1. By October 1, she had all the appearance of pregnancy; he made an examination per rectum and could palpate what he thought was a fetus. By the end of the 10th week of supposed pregnancy, there was no sign of whelping. He advised a Caesarian operation. When he opened the abdomen, he found a large tumor weighing 5½ pounds, involving the stomach, liver, kidneys and intestines. He sent a section of the tumor to the Pathological Laboratory at Cornell and they pronounced it a spindle cell sarcoma of about 8 weeks growth.

Dr. Ackerman also reported the case of a Boston terrier, which was ill for 9 days with what he diagnosed as acute gastritis. Symptoms were constant vomiting, slight abdominal pains, thirst and emaciation. The dog was destroyed and a post-mortem held. Stomach, normal; intestines, empty and normal; liver, considerably enlarged, inflamed and very dark in color.

Dr. Higgins, of the Lederle Laboratories, in reply to the question, Is true carcinoma common in animals? said he found epithelioma quite common in hogs, occasionally present in dogs and horses, and that he found carcinoma frequently in fish, as large as a duck's egg.

Dr. Fleischman reported an obscure disease amongst a number of old horses which had been pensioned off on a farm. The

horses were well and liberally fed on good food. Sixteen horses had died in the past 2 months, and the doctor posted three. He could find no lesions.

Symptoms.—Recumbent position, unable to get up, would eat and drink water normally, gradually became helpless and death ensued in 48 hours. The consensus of opinion was that the horses were suffering from an obscure form of cerebro-spinal meningitis.

Dr. McKim suggested that the Association print a list of members, with names and addresses in booklet form, and then mail them to the members of this Association. The President said he approved Dr. McKim's suggestion, and asked the Secretary to give the matter his attention. The President announced the standing committees for 1922.

Program Committee: Dr. Reid Blair, Chairman; Dr. C. W. Shaw and Dr. George H. Berns.

Prosecuting Committee: Dr. William J. McKinney, Chairman; Dr. C. G. Rohrer, Dr. E. A. Durner, Dr. R. W. Gannett and Dr. Thomas E. Corwin.

Legislative Committee: Dr. Ray W. Gannett, Chairman; Dr. Robert W. McCully and Dr. Reid Blair.

No further business appearing, meeting adjourned.

J. ELLIOTT CRAWFORD, *Secretary*.

NATIONAL ASSOCIATION BUREAU OF ANIMAL INDUSTRY VETERINARIANS, METROPOLITAN DIVISION

A meeting of the Metropolitan Division, N. A. B. A. I. V., was held at the Veterinary College, New York University, New York City, December 14, 1921.

Twenty-four members were present with President Dr. N. L. Townsend presiding.

Dr. L. D. Ives called attention of the members to the fact that the By-Laws adopted at the time of organization were now inadequate, and moved that a committee be appointed to draft by-laws similar to those of the National Association, but with such changes as would be applicable to the Metropolitan Division. Motion was seconded and carried. The President announced that he would name the committee later.

In accordance with the plans of the Program Committee, Dr. Mullings read his paper on "The Technique of Post-Mortem Inspection." In presenting this paper Dr. Mullings stated that it was based largely on the regulations, service and regulatory announcements, and bureau letters of instruction. He announced his intention of distributing copies among the inspectors of the Jersey City station for their guidance in conducting post-mortem work and suggested that this also be done at the other stations of the Meropolitan district with a view to securing uniformity in inspections.

Dr. Mullings' paper went into details as to the procedures to be followed by inspectors in conducting post-mortem inspections and it was explained that the procedures described represented the minimum of requirements. In certain cases, as would be readily understood, more extended or detailed examinations than those described in the paper would be necessary, as the particular case or judgment of the inspector indicated.

Following the reading, Dr. Mullings' paper was discussed by all the members present. Particular points of interest brought out in this discussion were, the relative merits of palpation and incision in the examination for tuberculous lesions in lymph glands and other tissues; also in conducting post-mortem inspections of tuberculin reactor cattle; emphasis was placed on the care necessary in searching for lesions and the importance of forwarding specimens for examination in suspicious or doubtful cases.

In discussing the question of inspection of cervical glands in cattle, Dr. M. Paolone called attention to an important point. He referred to the fact that very frequently the atlantal lymph glands, forming part of the superior cervical chain, remain attached to the carcass when the head is severed. This was important to bear in mind in rail inspection as the atlantal glands are usually involved when extensive lesions of tuberculosis are found in the cervical glands.

It was agreed by all the members present that the paper read by Dr. Mullings and the discussion following, made this meeting a profitable one for all concerned, and the writer was given a vote of thanks. The Program Committee announced that Dr. L. D. Ives would present at the next meeting a paper on the "Disposition of Carcasses."

The February meeting was held at the Veterinary College, New York University, on February 15, 1922.

Twenty-nine members were present with Dr. N. L. Townsend presiding.

Reports of Committees: The Program, Auditing and Legislative Committees announced through their respective chairmen that there were no reports to present at this time. With reference to the matter of revision of the Constitution and By-laws by a committee, as authorized by resolution approved at the last meeting, the President announced the appointment of Drs. J. Huelsen, M. J. Murphy and H. S. Weber as members of this committee. Dr. Huelsen stated that he would report progress at this time. However, a meeting of the committee would be held in the near future to work on the revision, which would be submitted to the members at the next meeting. Dr. Huelsen stated that in the meantime the committee would be glad to receive suggestions of the members which would be of assistance in the preparation.

In accordance with the plan of the Program Committee, Dr. Leland D. Ives presented a paper entitled "Some Data on the Disposition of Carcasses under Regulation 11, B. A. I. Order 211." Dr. Ives' paper was devoted principally to tuberculosis, the most important disease from a meat inspection standpoint. It discussed the regulations pertaining to the disease and described briefly its pathology. In connection with the paper, Dr. Ives exhibited specimens of tuberculosis, illustrating various types of lesions and stages of the disease.

The reading of Dr. Ives' paper was followed by an interesting discussion in which all members present participated. Among the points discussed were the interpretation of the terms "slight," "well-marked," "extensive," "caseous," "Caseo-calcareous," "calcareous," etc. During the discussion, different cases of the disease showing a varied distribution of lesions, as found on the slaughter floor, were cited and the opinion of the members given as to the proper disposition.

At the conclusion of the discussion, the chairman of the Program Committee announced that Dr. Ives' paper had furnished a very interesting and profitable evening for the members, to which all agreed. Further, that the importance of the subject warranted an extended discussion for which the limited time

available at one meeting had hardly been sufficient. Therefore, the chairman announced it had been decided to continue the discussion of Dr. Ives' paper, including diseases other than tuberculosis, at the next meeting. E. L. SANDER, *Secretary*.

BRITISH COLUMBIA VETERINARY ASSOCIATION

At a general meeting of the British Columbia Veterinary Association, held in Vancouver on December 17, at which a report was received, as stated at the recent Ottawa Veterinary Conference, that there was a grave lack of attendance at the Veterinary Colleges in Canada, and a consequent scarcity of qualified veterinarians to safeguard the health of the livestock of Canada, the following resolution was unanimously passed:

Moved by Dr. Hoggan and seconded by Dr. Strong that this association inform the veterinary colleges in Canada that we do not feel justified in trying to increase their attendance until such time as they make some effort to better the condition of the existing veterinarians, as at the present time there is little inducement to enter the profession, and that this association deplores the lack of support given to the veterinary profession, the veterinary practitioner in particular, by the governments, colleges and daily and farm press, and be it resolved that the various efforts which at the present time seem to be directed to assisting the stock owner to do without the services of the veterinarian, are a detriment to the profession and not in the best interests of the stock owner.

And be it further resolved, That we deplore the present tendency of many B. S. A. graduates to pose as veterinary surgeons and that in the opinion of this association it is more important to see that the existing veterinarian receives a just reward for his skill and services than to turn out a number of young graduates who, when they experience the true condition of the profession, will leave it in disgust as many older and experienced, capable graduates are doing at the present time, and that copies of this resolution be sent to the Dominion Department of Agriculture, the Provincial Department of Agriculture, the Veterinary Director General, the Veterinary Colleges, the daily and farm press, and the *Canadian Veterinary Record*.

I might add that recently the entrance requirements and length of course at the Veterinary Colleges were raised to equal that of the Medical Colleges, but that there has not been a corresponding recognition of the increased value of the veterinarian's services, which I think accounts for the much smaller number of young men being desirous of entering the profession.

We would like you to assist in placing the veterinary profession in a better position, which it justly deserves.

A. J. DAMMAN, *President*.

VETERINARY ASSOCIATION OF MANITOBA

Members who attended the annual meeting of the Veterinary Association of Manitoba witnessed a demonstration of the intradermal and ophthalmic tuberculin tests and post-mortem examination of reacting animals at Gordon Ironside, conducted by inspectors of the contagious diseases and meat inspection divisions of the health of animals branch of the Federal Department of Agriculture.

There was a long discussion on tuberculosis in cattle, after an address by Dr. George Hilton, chief veterinary inspector, health of animals branch, Ottawa. The meeting was held at the Royal Alexandra Hotel.

"In from 18 per cent to 26 per cent of all deaths of children in Canada from tuberculosis, the disease finds its origin in milk from infected cows," said Dr. George Hilton, at the opening session. "The public must be convinced of the danger of milk from infected animals if we are to save the lives and prevent the maiming of thousands of boys and girls annually."

Investigation by authorities of the New York health department into the origin of human tuberculosis, he stated, had revealed 75 per cent of tuberculosis of the glands and bones in children was of bovine origin; 66 per cent of generalized tuberculosis and 10 per cent of all tuberculosis in children could be traced to the same cause. Cooperation between veterinarians, cattle breeders, and all parties concerned, he urged, must be secured to combat the disease.

Instancing the ravages of the disease, Dr. Hilton stated that in a small city in Ontario where 800 children were found

to have tuberculosis, federal authorities investigated a dairy whose milk had been recommended by physicians for the sanitary methods. It was found that 50 per cent of the cows of this model dairy were infected.

Discussing the control of animal food products, Dr. W. A. Shoults, provincial department of health, Winnipeg, declared that milk was the most valuable foodstuff, and at the same time one of the cheapest, because it combined all the elements necessary for the development and nourishment of all organs and tissues in the human body. It was, at the same time, most susceptible to contamination and was responsible for more sickness and deaths than any other foodstuffs. It was the product of an animal susceptible to diseases to which human beings were subject. Of these diseases the most common was tuberculosis, of which there were four kinds, the human, bovine, avian and fish, but the last two were not pathogenic for man. Of deaths of human beings, 9 per cent were caused by tuberculosis and 25 per cent of the deaths of children under 16 were caused by the same disease. Many persons, he declared, liked to have their milk from one particular cow, but this was a greater source of danger than the market supply, for the one cow might be suffering from tuberculosis. If the milk from many were mixed, the danger would be greatly diminished. He believed that many cases of septic sore throat were caused by infected milk.

Addresses were also given by Dr. N. V. James, Gladstone, Manitoba, on "Rare Surgical Cases Encountered in Country Practice"; Dr. J. Rowe Fisher, Brandon, on the "Use of the Stomach Pump," and Dr. H. N. Thompson, Virden, Manitoba, on "Goiter Affecting Livestock."

There was a little discussion on the advisability of establishing a schedule of charges for veterinary services, so that persons employing them for tests and other duties would know that they were not being overcharged and everybody would be satisfied.

A committee of three members was appointed to draw up a schedule. The opening session of the convention was devoted to a business program, at the conclusion of which officers for the year were elected. They are Dr. H. R. McEwen, president; Dr. J. R. Fisher, vice-president; Dr. J. B. Still, secre-

tary and treasurer; Drs. J. A. Munn, W. J. Thompson, W. Hilton, W. A. Shoults, councillors. Dr. Munn, presenting his report as delegate to the convention of veterinary surgeons at Ottawa, stated that the Dominion body had appealed to veterinarians throughout Canada to standardize their rates in order that good will might be maintained between them and cattle men.

J. B. STILL, *Secretary*.

CENTRAL MICHIGAN VETERINARY MEDICAL SOCIETY

The Central Michigan Veterinary Medical Society held its annual meeting January 6, at the Otsego Hotel, with a very large attendance.

In the absence of the President, Dr. H. F. Roberts, Dr. W. N. Armstrong, Secretary-Treasurer of the Society, called upon Dr. B. F. Killham, Chief Veterinarian of the State of Michigan, to act as Chairman. After a few well-chosen remarks, the latter called upon Dr. T. S. Rich, who is head of the Eradication of Tuberculosis in Michigan, to explain the proposed tuberculin test, which is to be started in Jackson County. Dr. Rich stated there would be at least 15 Federal and State veterinarians to complete these tests.

Roy Decker, Jackson County Agricultural Agent, gave a talk on the Relation of the Agricultural Agent to the Veterinarian, which was well received.

Dr. A. B. Curtis of Hillsdale, presented an interesting review of the result of the tuberculin test in Hillsdale County, during which he stated that cattle could not be shipped into the county without the tuberculin test made by approved veterinarians.

Dr. C. C. Mix of Battle Creek, gave a splendid talk on the intradermic tuberculin test and its technic.

Dr. John Hutton of the Michigan Agricultural College at Lansing, told of the situation of the livestock in relation to veterinary medicine. Statistics show that in 1921 the number of livestock in the United States was 203,355,000 and the valuation \$6,235,469,000. Milch cows have increased in number 2,498,000, at a valuation of \$558,000,000. The number of horses in the United States in 1911 was 20,277,000, and in 1920 20,184,000. Michigan had 602,410 horses at the time of the

April census in 1910 and 605,509 in January, 1920. Dr. Hutton stated that the draft horse was much more economical than the automobile for short hauls.

Dr. H. F. Palmer of Goshen, N. Y., spoke on veterinary practice in New York State.

Dr. H. M. Newton of the Bureau of Animal Industry at Lansing, spoke on hemorrhagic septicemia and necrotic enteritis in hogs, stating that hog cholera, though quite prevalent in the State, is not alarming at this time.

Dr. A. McKercher of Lansing, had for his subject the opportunities of the present-day veterinarian, which brought out much discussion.

Dr. E. F. Meyer of Jackson, was elected President; Dr. Fred Mains of Albion, Vice-President, and Dr. W. N. Armstrong was reelected Secretary-Treasurer.

A Program Committee was appointed, consisting of Dr. A. Campbell of Jackson, Dr. John Scott of Jackson and Dr. F. Richmond of Springport.

A dinner was served at the Otsego Hotel following the meeting, after which several good talks and smokes were enjoyed by the members.

A vote of thanks was given Manager Magmer of the hotel for the splendid manner in which the dinner was served.

W. N. ARMSTRONG, *Secretary*.

VIRGINIA STATE VETERINARY MEDICAL ASSOCIATION

The Virginia Veterinary Medical Association met in regular session in Richmond on January 12-13. This was one of the best meetings in its history. The papers and discussions were of high order. Dr. Kaupp of Raleigh, N. C., gave a very interesting report and discussion on diseases of fowls; Dr. White of the Bureau of Animal Industry, Washington, discussed hog cholera; Dr. Shultz of Goshen Laboratories was rather shy when introduced to the association and simply mentioned the fact that he was there only as a representative of the Goshen Laboratories, but not to appear on the program. He expressed to the association greetings from Dr. J. F. Devine, who appeared on our program the year previous.

The banquet which took place at 1.30 on the 13th. was the event of the association. We had gathered around the board Governor Westmoreland Davis, Lt. Governor-elect West, Attorney General Saunders, and a number of senators and representatives. The toasts given by these gentlemen were timely. The association adjourned to meet in Blacksburg, Va., at the Agricultural College on July 13-14, 1922.

W. G. CHRISMAN, *Secretary.*

IOWA VETERINARY ASSOCIATION

The thirty-fourth annual meeting of the Iowa Veterinary Association was held at the Hotel Savery, Des Moines, Iowa, on January 17, 18 and 19. The meeting was one of the most successful in the history of the association, both from the standpoint of attendance and interest in all sessions of the program. Approximately 350 veterinarians were in attendance. Good fellowship and a general feeling of optimism prevailed. Particularly evident was a feeling that every eligible veterinarian in Iowa should become a member of the association and take an active part in promoting its interests, which are the interests of the veterinary profession. Thirty-six new applicants for membership were approved at the business session, which gives the association a total active membership of 496. Enough applications have been received since the meeting to total 500. Following the meeting in Des Moines, 125 veterinarians attended a one day's clinical program arranged by the Veterinary Division of the Iowa State College at Ames which was devoted to the subject of sterility in cattle.

Following the address of President A. Kaderabek of Fort Dodge on the opening day, a paper entitled "Business Aspects of Veterinary Practice," by Dr. D. M. Campbell of Chicago, Illinois, editor of *Veterinary Medicine*, was presented. In the afternoon, Professor John M. Evvard of Ames, an authority on cattle and swine feeding, presented a much appreciated address on "The Feeding of Minerals to Livestock," and various other phases of practical cattle and swine feeding. Professor Evvard produced experimental data on results of feeding various rations and mineral mixtures, emphasizing that the veterinarian

should be as thoroughly familiar with such data as the livestock man to whom he is an adviser.

The remainder of the first afternoon was devoted to the subject of tuberculosis. Dr. J. A. Kiernan, of the Bureau of Animal Industry, Washington, D. C., presented an excellent address outlining the "Progress in the Eradication of Tuberculosis in Livestock," followed by Drs. R. A. Moye, of Manson, and J. H. McLeod, of Charles City, who presented papers entitled, "Interest of the Small Town in Tuberculosis Control," and "The Tuberculosis Situation," respectively, in which phases of the subject were discussed of direct importance to the practicing veterinarian interested in stimulating interest in tuberculosis control in his own community and with particular emphasis on methods of promoting public sentiment toward guarding the milk supply to the average small town. A general discussion on tuberculosis control followed, led by Dr. Peter Malcolm, State Veterinarian.

On Wednesday morning, Wayne Dinsmore, Secretary of the Horse Association of America, gave an illustrated talk on "America's Greatest Engine—the Horse—An Animal Motor." Mr. Dinsmore emphasized the strategic position which the veterinarian occupies for encouraging increased horse production in his community and offered to furnish valuable data which might be used in counteracting truck and tractor propaganda, and also serve to strengthen the veterinarian with his clients by furnishing him usable information relative to practical hitches, problems of draft, etc. The remainder of Wednesday forenoon was devoted to papers and discussions on surgical topics. Drs. W. A. Aitken and G. W. McNutt of Ames presented an illustrated talk on the "Sinuses of the Ox," which was followed by a practical discussion by Dr. H. E. Bemis of Ames, on "Some Surgical Operations in Cattle." Dr. Bemis discussed proper methods of draining the sinuses in cattle, also operations on the eye, rumen, removal of actinomycotic growths and other tumors, and surgical drainage of certain areas. Dr. O. N. Schultz of Latimer presented a paper, "Operative Treatment of Umbilical Hernia in the Male Pig," followed by a paper on "Obstructive Hyperemia Treatment in Veterinary Practice," by Dr. W. E. Norden of Avoca. Dr. J. S. Schoenenberger of Winterset gave

a practical talk on "Methods of Animal Restraint," in which time saving methods in general practice were illustrated.

On Wednesday afternoon, following a number of case reports by Dr. H. L. McMillan of Estherville, on "Fractures" and "The Use of Acriflavine in Open Joints," and by Dr. R. J. Laird of Algona, on "Hemorrhagic Septicemia in Cattle," a paper entitled "Botulism in the Field," by Dr. John B. Bryant of Mt. Vernon was presented. Following this Dr. A. Eichhorn, of Pearl River, N. Y., gave a highly interesting talk in which he reviewed the progress made in the control of infectious diseases of animals, dwelling particularly on rabies, anthrax, blackleg, hemorrhagic septicemia and hog cholera. Dr. Eichhorn's address brought out many questions and interesting discussion.

Thursday forenoon was devoted largely to a business session, including reports of the Committee on Legislation by Dr. C. H. Stange and the report of the Executive Committee by the Secretary, H. D. Bergman. The Secretary-Treasurer's report showed the Association to be in good financial condition. The following officers were elected for the new year: President, E. A. Buxton, Vinton; First Vice-President, H. R. Wesson, Scranton; Second Vice-President, Guy S. Jones, Rockwell City; Secretary-Treasurer, H. D. Bergman, Ames (reelected); Member of Executive Board, John Patterson, Hedrick. During the business session considerable interest and discussion developed relative to inviting the American Veterinary Medical Association to meet in Des Moines in 1923. Following discussion by various members and the Secretary of the Convention Bureau of the Des Moines Chamber of Commerce, the association voted unanimously to invite the A. V. M. A. to meet in Des Moines in 1923.

Following the business session the day was devoted to papers and discussions as follows:

"Our Knowledge of Swine Diseases," by Dr. C. H. Stange of Ames. Dr. Stange emphasized the importance of veterinarians recognizing hog cholera as the most important, most prevalent and highly fatal disease of hogs, avoiding the use of immunizing agents, the value of which is questionable or unknown, and of studying more closely the housing, feeding and care of swine. Dr. Chas. Murray of Ames presented an instructive paper on "Diseases of Poultry," in which the importance of this field of practice was emphasized and enumerated the most prevalent

diseases of poultry, outlining preventive measures and treatment. Dr. E. A. Logan, of Kansas City, Kansas, presented an interesting paper on "Immunity, Its Theories and How Produced." A Question Box opened during the day precipitated some very interesting discussions along various lines of importance to the profession.

Dr. S. H. Johnston, of Carroll, presented an excellent report from the Committee on Resolutions. One of the important resolutions adopted unanimously by the association was as follows:

WHEREAS: The objects of this Association are to promote good fellowship; to elevate the standards of veterinary education; to cultivate medical science and literature, to enlighten and direct public opinion regarding state problems of veterinary medicine; to contribute to the diffusion of true scientific knowledge among its members by the reading and discussion of such papers and reports of cases as may come before it; and,

WHEREAS: It is not the object of this Association to determine proper compensation for services rendered which must vary greatly under different conditions,

Therefore, Be It Resolved: That the members here assembled approve and encourage the efforts of our members who by conduct, professional services and other efforts are endeavoring to strengthen the profession and promote the livestock industry; and,

Be It Further Resolved: That we disapprove and condemn the practices and methods of a few who are thereby bringing discredit upon the profession and injury to the animal industry of the state; and,

Be It Further Resolved: That we disapprove of profiteering in the handling of hog cholera serum and other biologics by the few veterinarians, whether members of this Association or not, who thereby bring condemnation upon the entire profession, and which will interfere with the future confidence of livestock breeders in the work of our profession.

No evening sessions were scheduled during the meeting, the evenings being left open for general getting acquainted, class and group reunions, committee meetings and recreation in general. The open evenings were apparently appreciated and resulted in excellent attendance and attention during the day sessions, as high as 300 being in attendance at some sessions.

H. D. BERGMAN, *Secretary.*

MISSISSIPPI STATE VETERINARY MEDICAL ASSOCIATION

The sixteenth annual convention of the Mississippi State Veterinary Medical Association convened in Gulfport on January 23 and 24 with 83 members and friends in attendance. The convention was opened by a fine address of welcome by the Mayor of Gulfport, to which a response was made by Dr. J. A. Barger of Jackson.

The following is the program rendered: "Tuberculosis Eradication and Control Work," Dr. Elmer Lash, Bureau of Animal Industry, Washington, D. C.; "The Treatment of Stomach and Intestinal Worms of Cattle and Calves," Dr. Dikmans, University of Louisiana, and Dr. Gandy, Assistant State Veterinarian of Louisiana; "Review of Progress Made in the Control of Infectious Diseases of Animals," Dr. Adolph Eichhorn, Pearl River, New York; "Anthrax and Its Control," Dr. S. H. Wood, Berkeley, California; discussion by Dr. O. M. Norton, Greenville, Mississippi; Dr. E. B. Mount, Cleveland, Mississippi, and Dr. C. C. Brown, Assistant State Veterinarian of Tennessee; "Botulism and Botulinus Antitoxin," Dr. C. E. Salsbery, Kansas City, Missouri; discussion by A. Eichhorn, S. E. Osborne and others; "Things We Are Up Against in Every-day Practice," Dr. C. L. Duckworth, Brookhaven, Mississippi, and Dr. I. W. Edwards, Vicksburg, Mississippi; "Swamp Fever, Differential Diagnosis and Treatment," Drs. W. L. Gates and M. J. Luster, Clarksdale, Mississippi; "Veterinary Education," Dr. C. A. Cary, State Veterinarian, Auburn, Alabama.

All of these subjects dealt with were pertinent to the practitioners of this section and considerable valuable information was obtained.

Anthrax, which claims a toll of many hundred animals each year in the delta section of this State, where it is considered by a great many that the organism is more virulent than in other sections of the country, was possibly the subject given the most attention at the convention, and it is considered fortunate that Drs. Eichhorn, Salsbery, Wood and Cary were present and furnished additional information regarding the control of this disease.

A large buck deer which had been killed by Drs. E. C. O'Neal, D. J. Bynacker and S. H. Davis the previous day

formed a part of the menu of the sumptuous banquet which was served to the members, friends and ladies at the conclusion of the first day of the convention. The second day was devoted entirely to sightseeing along the Gulf coast, which is known as Mississippi's winter playground.

The following officers were elected for the ensuing year: Dr. J. A. Barger, Jackson, President; Dr. M. J. Luster, Clarksdale, First Vice-President; Dr. I. W. Edwards, Vicksburg, Second Vice-President; Dr. H. L. Fry, Jackson, Secretary-Treasurer.

J. A. BARGER, *Ex-Secretary*.

PENNSYLVANIA VETERINARY MEDICAL ASSOCIATION

The Pennsylvania State Veterinary Medical Association held its 1922 meeting at Harrisburg, January 24 and 25. The week of January 23 is known as Agricultural Week in Pennsylvania, and the State Veterinary Medical Association being one of the Allied Agricultural Associations, holds its meetings at the same time that the other allied organizations are holding their meetings.

Holding our meetings at the same time that the other organizations are in session has the distinct advantage of bringing the practitioners of Pennsylvania into close contact with the livestock owners, and gives the stock owners an opportunity to see that the veterinarians are well organized and a representative group of men who are taking their proper places in agricultural activities.

Pennsylvania meetings are very well attended. Our usual place of meeting would have accommodated our own number, but the attendance had been increased to such an extent by livestock men that this year the committee of arrangements secured the Hall of the House of Representatives in the Capitol Building. This hall was filled to capacity on the second day of our meeting.

The program, as published in a former issue of the JOURNAL, was carried out in its entirety. Papers of every-day interest to practitioners were presented by practitioners, and every section of the State was represented. This was made possible by inviting the officers of each veterinary club in this State to desig-

nate one man to present a paper at the State meeting and two men to discuss their fellow member's paper. Any success that the meeting may have attained is due to the good cooperation of the men appearing on the program.

It has been the practice of our association to publish the proceedings of our annual meetings, and it is hoped that means will be devised whereby the 1922 proceedings may be published. If this is not accomplished in a single publication, it may be found possible to publish the papers through other channels.

Election of officers resulted as follows: President, E. E. Bittles, Waterford; Vice Presidents, H. B. Roshon, Reading; B. M. Beattie, Chambersburg; M. A. Davis, Troy; Recording Secretary, C. S. Rockwell, Philadelphia; Treasurer, Thomas Kelly, Philadelphia; Corresponding Secretary, R. M. Staley, Philadelphia; Trustees, John W. Adams, Chairman, Philadelphia; H. E. Bender, Lititz; L. A. Klein, Philadelphia; John Turner, Wellsboro.

R. M. STALEY, *Secretary*.

MICHIGAN VETERINARY MEDICAL ASSOCIATION

"We Represent the Protectors of a Ten Billion Dollar Industry," was the wording of a banner prominently displayed in the Surgery and Clinic Building at the Michigan Agricultural College when the Michigan State Veterinary Medical Association held its 40th annual meeting there on February 7 and 8. The attendance was beyond expectation. There were 110 veterinarians registered and 30 wives who attended the sessions for the ladies. Practically everyone present attended the dinner-dance on the evening of the first day.

The papers and discussions manifested the trend of affairs in the profession in this State. They indicated that the profession is changing with the times. Much was said about tuberculosis eradication, diseases of dairy cattle, municipal meat inspection, public health work, poultry diseases and very little about subjects that were commonly discussed a few years ago.

The social event of the meeting, which was so popular a year ago, was repeated this year and was received with even more enthusiasm than last year. A banquet fit for a king, with music by a college orchestra and entertainment by the college yell-master who is a veritable comedian, followed by dancing, cards,

smokes and real heart-to-heart talks with old friends, occupied the whole evening.

The ladies enjoyed a theater party, the dinner-dance, a lecture on nutrition in the Home Economics Department of the college, a visit to the Girls' Practice House, an exhibition of swimming by co-eds in the gymnasium-pool, and a luncheon where men were entirely excluded.

Clinic consisted of a radical operation for fistulous withers, one for laryngo-hemiplegia, and a demonstration of a treatment for sterility in a cow.

The association went on record as endorsing the Sterling-Lehlbach bill for the reclassification of civil employees. It was voted to hold a summer meeting at the college in conjunction with the Veterinary Department of the College, the State Bureau of Animal Industry and the local branch of the Federal Bureau of Animal Industry.

The following officers were elected for the year: President, Dr. J. E. Wurm, Practitioner, Pigeon; 1st Vice-Pres., Dr. B. J. Killham, Chief Veterinarian, State Department of Agriculture, Lansing; 2d Vice-Pres., Dr. H. Preston Hoskins, Parke, Davis & Co., Detroit; 3d Vice-Pres., Dr. G. W. Cronkite, Practitioner, Saginaw; Secy.-Treas., Dr. R. A. Runnells, Department of Animal Pathology, Michigan Agricultural College; Director for six years, Dr. W. N. Armstrong, Practitioner, Concord.

R. A. RUNNELLS, *Secretary*.

OHIO STATE VETERINARY MEDICAL ASSOCIATION

The thirty-ninth annual meeting of the Ohio State Veterinary Medical Association was held in the Hotel Deshler, Columbus, February 2 and 3, 1922. It was very largely attended and in many respects proved to be as satisfactory as any previously held.

Ohio veterinarians were fortunate in having the opportunity of hearing probably more good speakers than we have had at any single meeting in the past. Every effort was directed to have the program so balanced that, regardless of what particular line of veterinary work one was primarily interested in, he would find something directly interesting him.

The subjects and speakers were: "The Bull as a Dissemina-

tor of Genital Infections," Dr. W. L. Williams; "Botulism," Dr. Robert Graham, University of Illinois; "Observations of Veterinary Practice," Dr. J. V. Lacroix, Editor, *North American Veterinarian*; "Brief Consideration of the Splanchnology of the Fowl," S. Sisson; "Importance of the Poultry Industry," O. V. Brumley; "The Modern Dairy Goat," William H. Gribble; "Cooperation and Policies," Bruce Edgington, State Veterinarian; "Use of the Stomach Tube in the Horse," C. C. Page; "Swine Diseases and Management of a Hog Ranch," Donald J. Frame; "Demonstration of the Examination of the Feces of the Dog for Parasitic Infestation," L. W. Goss and R. E. Rebrassier; "Sterility and Abortion from a Practitioner's Standpoint," R. R. Laughlin. In addition to the above-mentioned veterinary speakers, the Association was addressed by L. J. Taber, Director of Agriculture of Ohio; Wayne Dinsmore, Secretary of the Horse Association of America; Howard C. Barker, Secretary of the Holstein-Friesian Association of Ohio, and Col. D. L. Perry, auctioneer, known well and favorably over the Middle Central States.

The reports of the committees were usually good, in that they called the attention of the profession to existing conditions of all kinds. The Legislative Committee made a rather detailed report on existing conditions in Ohio with respect to illegal serum and virus sales to nonlicensed "swine specialists." The report was based upon over 100 replies to a questionnaire mailed out January 10. By action of the Association a special committee was appointed to collect information upon such illegal sales in Ohio during this year, and to notify the members at least quarterly of all facts learned, including the names of such firms as sell promiscuously to these laymen without a permit from the State.

In his "Good Night" remarks after the banquet, February 2, Dr. Harry T. Moss announced that those present had just enjoyed filet of Percheron with mushroom sauce, the same having been brought from Lima, Ohio, by Dr. J. H. Blattenburg.

The commercial exhibits were an important part of the meeting. Out of consideration to these firms we offer the suggestion that the secretaries of the various State associations holding meetings in January and February each year endeavor

now to select dates which will not conflict, thus enabling each firm to attend all meetings. The advertising of these same firms goes a long way in supporting many veterinary publications within our country.

F. A. LAMBERT, *Secretary.*

VETERINARY CONFERENCE AT KANSAS AGRICULTURAL COLLEGE

The first annual veterinary conference was held at the Kansas State Agricultural College during Farm and Home Week, February 7 to 10, inclusive. More than 250 graduate Kansas veterinarians were in attendance. A very full and comprehensive program on animal tuberculosis was carried out in every detail. Those who took an active part in the conference were Dean Dykstra, Doctors Bushwell, Leinhardt, Sisson, Kiernan, Salsbery, Campbell, Muldoon, Stingley, Kinsley, Umberger and Mr. Mercer. There were demonstrations and practical exercises in the application of the various tuberculin tests, together with the slaughtering of the reacting cattle and practicalum in meat inspection. The Farm and Home Week banquet was a fine diversion which was appreciated by all. The veterinarians attending this short course in animal tuberculosis were very much pleased with the material presented and the unanimous wish was expressed that Dean Dykstra would make it an annual affair.

KENTUCKY VETERINARY MEDICAL ASSOCIATION

The midwinter meeting of the Kentucky Medical Association was held at Owensboro, Kentucky, on February 8-9, 1922. We enjoyed one of the most successful two-day meetings ever held in the western part of the State.

On the first day Dr. C. W. Fisher, of Danville, presented a paper on Forage Poisoning; Dr. W. W. Dimock, of Lexington, gave an interesting talk on Johnes's Disease; while Dr. G. P. Isbell spoke on Locus Minoris Resistentia. These papers were discussed by Dr. T. P. Polk, Lexington, Dr. D. E. Westmoreland, Owensboro, and Dr. H. Gieskemeyer, Newport. Dr. W. W. Dimock also took active part in all discussions and some very valuable information, as usual, was gleaned.

Thanks to the untiring efforts of the entertainment committee a delightful banquet was served that evening at the Rudd House.

The second day was devoted entirely to the subject of tuberculosis. Dr. Elmer Lash, of Washington, D. C., read a most interesting paper on "The Campaign to Eradicate Bovine Tuberculosis," after which a general discussion followed. Dr. W. H. Simmons, State Veterinarian, read a paper on "Tuberculin Testing of Cattle by the Intradermic Method." In the discussions that followed Dr. W. F. Biles and Dr. E. B. Haskins took an active part. Some very valuable points were brought out regarding dosage, size of syringe, needle, etc. In the afternoon, post-mortems were held on reactors at the field packing plant. This was followed by examinations for accredited herd work, which brought to a close one of the most interesting meetings ever held by this Association.

The following resolution was unanimously adopted:

WHEREAS, The Bureau of Animal Industry of the United States Department of Agriculture is the largest unit in the world composed primarily of veterinarians, and that this class of scientific employees render an invaluable service to the nation in the protection of livestock against the ravages of contagious and infectious diseases, and

WHEREAS, the compensation offered by the United States Government for this class of professional services is not adequate or in comparison with the training and qualifications required for veterinary positions in the Bureau of Animal Industry, and

WHEREAS, the low salaries paid by the Government to its veterinarians engaged in the control of animal diseases in the field and in the application of the Meat Inspection Law of 1906, bring about the resignation of many of these trained inspectors each year, lowering the efficiency of public service of this class, therefore,

Be it Resolved, By the Kentucky State Veterinary Medical Association in session assembled, that we urge upon the Congress of the United States early and favorable action on pending legislation which has for its object the reclassifying of the Department of Agriculture, and

Be it Further Resolved, That copies of this resolution be forwarded to Senator Stanley and Senator Ernst.

The officers elected were as follows: J. K. Ditto, Pleasureville, president; William M. Coffee, LaCenter, first vice-president; J. A. Austin, Fulton, second vice-president; E. C. Higdon, Madisonville, third vice-president; J. A. Winkler, Newport, secretary-treasurer.

The midsummer meeting of this Association will be held in Lexington, on July 12 and 13, 1922.

J. A. WINKLER, *Secretary*.

VETERINARY CONFERENCE AT THE UNIVERSITY OF PENNSYLVANIA

On February 28 and March 1 a very interesting conference of veterinarians was held at the School of Veterinary Medicine of the University of Pennsylvania. There were about 175 veterinarians in attendance, largely from Pennsylvania, but many from New York, New Jersey, Delaware, Maryland, District of Columbia and Ohio. The program provided for the presentation of many phases of the problems connected with the swine and cattle industry by recognized authorities. The speakers covered their subjects in a masterly manner, and the great interest of the audience was manifested by the lively discussions which followed.

On the opening day, Dr. E. C. Schroeder, of the U. S. Bureau of Animal Industry, delivered a paper on "The Present Status of Vaccination Against Abortion Disease of Cattle." He emphasized the necessity for more knowledge of the nature of the abortion bacillus before the subject can be lifted out of the experimental state in which it now is. He also said that tremendous doses of living cultures were necessary in attempting immunization; that an animal so treated would possibly be a spreader; and that there is no reason to believe that dead suspensions of the organism have any immunizing value. Dr. Schroeder told of his study of twenty-four samples (representing five different firms) of anti-abortion vaccines obtained on the market. Of these 15 contained only bacteria identified as the Bang bacillus, 2 contained other bacteria and the Bang bacillus, and 7 contained many other bacteria and a spore.

His conclusions were that 44 per cent of these samples were

of doubtful value and 79 per cent were not only doubtful but worthless and dangerous.

Following this well-discussed paper, Dr. John P. Turner, of Washington, D. C., gave a very practical paper on "Experience in Practice with Udder Troubles." Dr. Turner covered the subject thoroughly, giving sound practical advice on the handling of every possible disease of the udder. He emphasized the importance of preventing mastitis, and advocated a large, clean, disinfected maternity stall for parturient animals; cutting off the hanging fetal membranes and eliminating sucking calves when the teats are sore. He questioned the presence of contagious mastitis in this country, most cases being sporadic.

In the afternoon session, Dr. W. L. Boyd, of the University of Minnesota, talked on "The Diagnosis of Pregnancy in Cows," and paved the way for the subject of sterility which he discussed the next day. He does not lay so much stress on the pulsation in the uterine arteries in diagnosing pregnancy as on the mucous plug in the cervix, the corpus luteum and the changes in the uterus. Ballottement is not possible before seven to seven and one-half months, according to Dr. Boyd, who also said that in heifers accidentally bred or if for other reasons it is desirable to terminate pregnancy, it may be accomplished at about the second month by expressing the corpus luteum, after which abortion will follow in about three days.

Acting Provost, Dr. J. H. Penniman, gave the attending veterinarians a very cordial welcome and spoke in a most appreciative manner of the work they are doing and the importance of it. He referred in very flattering terms to the Veterinary School of the University of Pennsylvania and to the fact that the University is proud of its scientific achievements.

A paper on "Hygiene and Sanitation in the Care of Young Animals" was presented by Dr. E. S. Deubler, of Penshurst Farms, Narberth, Pa. He spoke particularly of handling white scours, and told how he had kept his calves free from its ravages by building maternity stalls, with tight partitions, to the ceiling, and disinfecting the same after each calving with formaldehyde gas. He also urged the necessity of keeping heifers away from abortion infection for six months before breeding and until after parturition.

In the evening the conference was delightfully entertained

first by Dr. Edward Lodholz, Professor of Veterinary Physiology at the University of Pennsylvania, on the subject of "The Physiology of the Fetus." Following this entertaining lecture a smoker was given by the Alumni Society of the school.

The second day's program started with a lantern-slide talk by Dr. Boyd, on "The Pathology of Bovine Sterility." He explained thoroughly the slides which covered every conceivable pathological condition related to the subject. Later Dr. Boyd gave a practical demonstration of examining and treating sterility on five cases provided for the purpose. He handled the subject in a convincing manner, answering innumerable questions to the satisfaction of all. In discussing this subject, Dr. W. H. Ridge, Pennsylvania Bureau of Animal Industry, gave an interesting talk on prevention. He believes that the douching of all cows with a one and one-half per cent Lugol's solution from one week to ten days after calving is not injurious but beneficial, and submitted charts of the breeding records of three herds of several hundred animals which he had been treating in this manner for four years, and the proof seemed conclusive that sterility had been reduced to a minimum.

Dr. George W. Grim, of Plainsboro, N. J., read a paper on "Treatment of Retained Placenta in the Cow." His experience covered 107 cases. Many different methods were reported with the results attending. The conclusion seemed to be that the membranes should be removed as soon as they can be readily separated from the cotyledons. In a number of cases he took them away in twenty-four hours with satisfactory results.

The final session was opened by Dr. W. B. Niles, of the U. S. Bureau of Animal Industry, whose subject was "Hog Cholera and Other Infectious Diseases of Swine." Among the many important points brought out by Dr. Niles, the following were noted:

1. Hog cholera may be controlled, but it will be many years before its eradication.

2. Owing to the varied symptoms and lesions, the diagnosis of hog cholera is often difficult, but delay is dangerous, so use serum alone if not sure of diagnosis, and double treatment if no doubt exists.

3. The administration of the simultaneous treatment a short time after a single (serum) treatment does produce immunity, contrary to the belief of some.

4. "Breaks" are likely caused by insufficient virus or virus

of low potency. Best to handle "breaks" as any other outbreak.

5. Hogs, newly purchased in stock yards, should be given serum. After they are taken home and are over the fatigue of journey, etc., give double treatment.

Following Dr. Niles' interesting and instructive talk, Dr. H. H. Havner, of State College, Pennsylvania, spoke on "The Swine Industry in Pennsylvania." He explained how the State College Extension Department is developing the swine industry in Pennsylvania, and pointed out the difference in the status of this industry in Pennsylvania and Iowa, showing that improvement must be accomplished by community effort, because rarely does one farmer have enough sows to warrant the purchase of a high-class purebred boar.

Numerous feeding trials which have been conducted in various parts of the State were explained, and he showed that farmers who had marketed their corn through their hogs had received twice the market price for it.

It is regrettable that space does not permit the reporting of the valuable and instructive discussions which followed the papers. The conference was considered a great success by the many who attended.

V. G. KIMBALL, *Recorder*.

ARKANSAS VETERINARY ASSOCIATION

This is to advise that the Arkansas Veterinary Examining Board will meet at Old State House, Little Rock, Arkansas, Thursday, June 8, 1922, for the purpose of examining applicants for license to practice Veterinary Medicine.

The Arkansas Veterinary Association will meet at Little Rock on Friday, June 9, 1922.

A cordial invitation is extended to all veterinarians to attend.

JOE H. BUX, *Secretary*.

MISSOURI VALLEY VETERINARY ASSOCIATION

The winter meeting of the Missouri Valley Veterinary Association was held at the Hotel Baltimore, Kansas City, January 31 to February 2. The first two days were devoted to papers and discussions, and a number of especially valuable contributions were made. The last day was devoted to the clinic held at the Livestock Pavilion of the Kansas City Stockyards.

President P. L. Cady presided at all of the sessions and deserves much credit for the able manner in which the program, as well as various discussions and matters of business, was handled.

The program was opened by a paper entitled "Cooperation in Animal Disease Control Work" by W. T. Spencer of Omaha, Nebraska. This paper made such a favorable impression that it was voted to have copies prepared at once to be supplied to all members of the organization, as well as to the leading agricultural publications of the country. The keynote was a strong plea for a more liberal spirit of helpfulness between members of the veterinary profession and the agricultural interests. The author stated that much injury has been done to the profession by petty jealousies and by trouble makers who have taken much pains to create a feeling between veterinarians and agricultural organizations, whose interests, he pointed out, are common.

Dr. E. F. Stewart presented a very interesting paper on "Milk Goats," giving some information of value pertaining to the various breeds, their productivity and their fitness for a place in the yards of those who are not in a position to keep a cow. Dr. Stewart is a recognized authority on milk goats.

Dr. G. A. Johnson presented a splendid paper prepared by himself and Dr. E. A. Logan on "Immunity." They gave a complete discussion of the forms of immunity and the methods of producing it.

An excellent paper by Dr. S. R. Johnson of Lansing, Michigan, entitled "The Practicing Veterinarian and His Relation to the Public Health," was read by title.

Dr. C. P. Fitch of St. Paul, Minnesota, gave a well-written paper on "The Control of Bovine Infectious Abortion." He contends that the abortion bacillus is seldom transmitted through the genital tract, but that the digestive tract is the principal port of entry. He regards the serological test as an accurate method of diagnosing infection, but that it is not necessarily an indication that the animal has ever aborted or will abort. He believes that much remains to be learned in connection with the control of the disease, but that sanitation and isolation of affected animals are important considerations. This paper was followed by a lively discussion.

Dr. S. L. Stewart read an interesting paper on "Interstitial Mastitis," a condition of which he has been making special study

for some time. He pointed out the pronounced difference between interstitial and parenchymatous mastitis. His line of treatment consists usually in an application of cold packs to the region, followed by mild massage, after which a mammary support is applied. He regards bacterins as an important adjunct to this treatment.

Dr. R. C. Moore of St. Joseph, Missouri, read an unusually valuable paper upon "Orificial Surgery." He took up specifically the surgery of the eye, ear, tracheal openings, urethra, vulva, anus and teat ducts. This paper is one which will be worthy of careful perusal when it appears in the veterinary press.

Dr. L. A. Merillat gave an extemporaneous address on "The Prospects of Equine Practice," in which he detailed some of his personal experiences in tractor farming, which only add emphasis to the statements made by others who have either engaged in or studied this problem. He believes that we will see both in the city and in the country a pronounced reaction from the tendency toward motor transportation and cultivation of the land.

"Canine Distemper" was ably discussed by Dr. J. C. Flynn. He called attention to some of the common dental affections of dogs which may be satisfactorily alleviated by the veterinarian. Among these are irregular dentition, accumulation of tartar, and alveolar periostitis.

Dr. F. R. Beaudette of Manhattan, Kansas, gave one of the most valuable addresses of the meeting on "Diseases of Poultry." A tabulated list of diseases as indicated by various symptoms proved to be a valuable aid to a classification of these diseases. Copies of this chart will be supplied to members of the association at an early date.

Dr. E. A. Cahill in a paper entitled "Botulism as it Applies to Swine" detailed the results of extensive investigations in connection with the alleged danger of introducing botulism through serums and virus in vaccinating hogs. The results of hundreds of such tests were negative in every case. He considers botulism from this source to be a negligible factor and the use of botulinus antitoxin as a preventive of botulism from such cases to be entirely superfluous.

Dr. J. W. Connaway of Columbia, Missouri, presented a series of lantern slides dealing with infectious abortion in swine,

which he considers to be specific infection similar in many ways to abortion disease of cattle. His studies have been interesting and proved very instructive.

A most valuable contribution was presented by Dr. H. B. Raffensperger of the United States Bureau of Animal Industry on "Ascarids in Swine." His paper was supplemented by a two-reel motion picture giving the details of the life history of this worm and the control measures which have proved effective. He stated that the identity of *Ascaris suum* of swine and *Ascaris lumbricoides* of children has been proved. In some cases ascarid infestation in children may result from exposure to places where wormy hogs have contaminated the soil. The recent discoveries regarding the life cycle of the ascarid prove that the young larvæ migrate into the portal circulation and by this route reach the lungs, where they often cause an intense edema, accompanied by a characteristic thumpy respiration. Comparisons of hogs infested with ascarids and those kept free from birth showed a very pronounced advantage in favor of the ascarid-free pigs. Pigs can be kept free by putting the parturient sows into farrowing pens which have recently been thoroughly scrubbed with hot water and lye, the sow herself first being thoroughly cleaned and freed from dirt. The brood is later transferred to pasture in which infested hogs have not previously been run. The ascarid eggs germinate at comparatively low temperatures and in wallows, mud holes, etc., where some moisture is present, becoming infectious within a few weeks after they reach the outer world in the droppings of infested hogs. They are exceedingly resistant to the action of disinfectants and require such measures as hot water and lye to destroy them effectively.

Dr. M. Dorset was listed to present the subject "The Present Status of Hog Cholera Immunization," but on account of his inability to attend the meeting, Dr. W. B. Niles ably substituted for him. Dr. Niles considers that hog cholera is the one great scourge of the hog raiser and that it is usually a safe procedure to vaccinate without waiting for a positive diagnosis of the disease. He considers that the serum immunization is of considerably shorter duration than has been generally thought, but that the serum-alone treatment is indicated in those cases where there has been a "break" following regular vaccination.

During the clinical program a number of interesting oper-

ations and demonstrations were put on by Drs. Beaudette, Young, Kingman, Merillat and others.

The social program was well arranged, and visiting ladies were entertained by the local committee at card parties, theater parties, tours, etc. On Wednesday evening a vaudeville program and dance were tendered the visitors by the veterinarians of Kansas City and their wives, to whom much credit is due for their well-arranged plans and generous expenditures of time and money to make the meeting a success.

R. F. BOURNE, *Secretary*.

PRACTITIONERS' COURSE AT AMES

The annual meeting for practitioners given under the auspices of the Practitioners' Course Fund was held at Ames, Iowa, January 20, 1922. The meeting was given over to a consideration of the diseases of breeding animals.

One hundred and twenty-five veterinarians from the state and surrounding states were present and showed a great interest in the subject presented. This number represents about one-sixth or one-seventh of the total number of practicing veterinarians in Iowa and indicates the importance of this subject and the interest being taken in helping to solve the problems of the breeders of livestock.

The program for the day was as follows:

10 to 10:30 a. m.—Registration.

10:30 to 12:30—Lecture and demonstration on the normal genital tract of the cow at various stages of the estrus cycle.

1:30 to 5:30 p. m.—Lecture on the most common causes of sterility in cattle in Iowa followed by a demonstration of the technique of the surgical treatment of sterility.

In demonstrating the normal, freshly dissected specimens, three living animals, and one anatomical specimen of the entire animal suspended in the normal position in a fresh state with all organs in their normal relation to each other were used.

In demonstrating the abnormal, nine clinical cases provided by the clinic staff affected with various conditions, and a number of pathological specimens in a fresh state obtained through the courtesy of Dr. L. Enos Day of Chicago and Dr. C. W. Deming of Des Moines, were used.

During the latter part of the afternoon, each one present was given an opportunity to inspect for himself each specimen and each case in order that as much detailed information might be given as possible. The specimens presented illustrated a variety of congenital malformations and failures of proper development which result in sterility, cystic ovaries, persistent corpora lutea, endometritis, pyometra and retained placentae. Also a series of pregnant uteri showing the size and development in the various ages from one to eight months. The clinical cases illustrated cystic ovaries without nymphomania, cystic ovaries with nymphomania, pyometra, endometritis, cervicitis, and vaginitis in cows, and metritis and congenital lack of proper development of the genitalia in sows.

H. E. BEMIS, *Chairman.*

NEVADA VETERINARY ASSOCIATION

The Nevada State Veterinary Association held its fourth annual meeting in Reno on January 31, 1922.

The program consisted of an afternoon and evening session.

At the first session, Dr. George H. Hart, of the University of California, gave a review of the present status of knowledge regarding infectious bovine abortion and some of its allied problems. His address was followed by Mr. Chas. E. Fleming, of the Nevada State Experiment Station, on the "Commoner Poisonous Plants of the Meadows and Ranges of Nevada." Dr. L. R. Vawter then gave a review of "Abstracts from Current Medical and Veterinary Literature."

The evening session, held at the Reno Chamber of Commerce, was thrown open to dairymen and stockmen.

Dr. Hart spoke on "The Major Economic Factors Concerned in Dairy Development." Mr. Chas. Norcross, of the Agricultural Extension Division, offered some remarks on "The Financing of Farm Projects" and stressed the need of some system whereby the farmer might operate under long-term credit in the development of permanent farm improvement.

The annual election of officers resulted in the selection of Lyman R. Vawter as president, Walter H. Hilts, stationed at Elko, as vice-president, and Stephen Lockett as secretary-treasurer.

STEPHEN LOCKETT, *Secretary.*

COMMUNICATION

INTERPROFESSIONAL COOPERATION

TO THE EDITOR:

I am quoting you an extract which I believe should be of interest to readers of THE JOURNAL. It is from an editorial in the current (January) number of *The Journal of State Medicine*, which is the official journal of the Royal Institute of Public Health, London, of which I happen to be a member—Overseas.

It is as follows:

“In view of the increasing importance of a more accurate knowledge of diseases communicable from animals to man and the necessarily greater part veterinary surgeons must take in preventive medicine, and further, the now recognized connection of dentistry with child life, the Council has resolved to extend an invitation to veterinary surgeons and registered practitioners in dentistry to join the Institute, by which means they hope to extend its usefulness, and impress the public from a public health point of view of the importance of their respective professional duties.”

This sounds good, and I feel that the information ought to be disseminated.

W. H. DALRYMPLE.

GIBSON GOES TO ST. JOSEPH

Dr. J. I. Gibson, formerly State Veterinarian of Iowa, and more recently a field agent of the Illinois Veterinary Medical Association, has been engaged by the St. Joseph Livestock Exchange, the Stock Yards Company and related interests to direct a campaign to eradicate animal tuberculosis in the territory tributary to the St. Joseph market. He has moved from Bloomington, Ill., and will immediately outline a program of operation for northwest Missouri, Kansas and Iowa. It is probable that Dr. Gibson will proceed along the line of similar work now being carried on under the direction of the Livestock Exchange at Kansas City, St. Louis, Omaha, Chicago and other markets.

NECROLOGY

Dr. Joseph D. Dunkel died on January 29 at his home, 25 Orchard Street, New Rochelle, New York. A severe cold terminated in pneumonia. His death came as a shock to his friends, and Dr. Dunkel had many of them.

Dr. Dunkel was born in the vicinity of New York City May 31, 1887, graduated from the New York American Veterinary College in the class of 1908, and entered the service of the United States Bureau of Animal Industry December 4, 1908. In April, 1912, he was selected to succeed Dr. J. J. Hayes, who resigned as assistant chief of the Bureau station at New York to head the Manhattan Sanitary Inspection Association, and on January 1, 1917, he left the Bureau to succeed Dr. Hayes again, who resigned his position with the Manhattan Sanitary Inspection Association.

Dr. Dunkel was a man of pleasing personality. This, together with the ability, energy and earnestness he always displayed in his work, attracted attention, and he was induced to accept a position with the United Dressed Beef Company of New York City on January 1, 1919, and was advanced rapidly to the position of assistant superintendent. Dr. Dunkel is survived by a widow and two children, who in their bereavement have the sincere sympathy of all who knew him.

Dr. Henry S. Lewis, of Chelsea, Massachusetts, died on January 4, 1922, of pneumonia. He was ill only a few days.

Dr. Lewis was a graduate of the Veterinary School of Harvard University in the class of 1889. He joined the American Veterinary Medical Association in 1899. He was a member of the first Veterinary Examining Board of the State of Massachusetts.

Resident Secretary W. H. Robinson reports the death of Dr. William L. West of Belfast, Maine, who was a member of the Maine Veterinary Association and the A. V. M. A. Dr. West died the latter part of December.

He also records the death of J. B. Darling of Belfast, Maine, who passed away January 10, 1922. He was a member of the Maine Veterinary Medical Association.

MISCELLANEOUS

IT'S PYORRHEA

By J. M. B.

Have you corn upon your toes?
It's pyorrhea.
Have you freckles on your nose?
It's pyorrhea.
When you hurry do you wheeze?
Are you shaky at the knees?
Are you getting hard to please?
It's pyorrhea.

Have you specks before your eyes?
It's pyorrhea.
Has your head increased in size?
It's pyorrhea.
Are you restless when at home?
Are you bald upon the dome?
Did you ever write a poem?
It's pyorrhea.

Is your liver out of whack?
It's pyorrhea.
Have you pimples on your back?
It's pyorrhea.
Are you itchy anywhere?
Have you dandruff in your hair?
Have you any cash to spare?
It's pyorrhea.

IT'S BOTULISM

(With Apologies to J. M. B.)

Do your cattle stagger round?
It's botulism.
Do they stamp and paw the ground?
It's botulism.
Have their eyes a glassy stare?
Is there roughness in their hair?
Is their skin rubbed smooth and bare?
It's botulism.

Have your hens the limberneck?
 It's botulism.
 Do they flounder on the deck?
 It's botulism.
 Gapes and pip lose all their terror,
 Former names are all in error,
 Chicken pox is growing rarer,
 It's botulism.

Do your swine reject their swill?
 It's botulism.
 Have you funds to pay your bill?
 It's botulism.
 Forget scirrhus cord and scabies,
 Forage poisoning and rabies,
 Even ills of little babies,
 It's botulism.

THE NEW AUTOMOBILE EMBLEMS

In this issue of the JOURNAL is enclosed a folder. On the title page there is a reduced cut of the new automobile emblem. This emblem is a very handsome one, of crimson, white and gold. It is furnished with pins, ready to be attached to the radiator. The California veterinarians ordered seventy-five in one lot.

Many cities extend parking and other traffic courtesies to those having the emblem on their cars. Every member of the Association should have one of these beautiful emblems. The price is only \$1.25 postpaid. Send your order at once to Secretary Mayo.

In Detroit, where so many of the nation's automobiles are manufactured, the Animal Welfare Association reports 70,000 horses—a gain over 1917 of 10,000, and over 1911 of 30,000.

Dr. M. C. Essex is now at the Werntz Memorial Veterinary Hospital, and the JOURNAL wishes him success in his new field of endeavor.

Dr. O. E. Troy, of Raton, New Mexico, Resident Secretary of the A. V. M. A. for that State, was married on January 3, 1922, to Miss Alvina Postel of Albuquerque. They have just returned from a two months' honeymoon trip to the Hawaiian Islands and will be at home to their many friends in Raton, N. Mex.

JOURNAL

OF THE

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(Original Official Organ U. S. Vet. Med. Ass'n.)

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No. 2

BE ON WATCH FOR FOOT-AND-MOUTH DISEASE

IT IS reported that since January 1, 1922, foot-and-mouth disease has been discovered in over 1,100 herds in England and Scotland, resulting in the slaughter of more than 50,000 animals, at a cost estimated at \$5,000,000. The seriousness of the outbreak is apparent when we recall that only 4,461 and 3,636 animals respectively were slaughtered as a result of the disease during the outbreaks of 1902 and 1908 in the United States.

Although the outbreak in the British Isles has been quite extensive, it seems to be under better control now than at any time since the beginning early in January. The origin of many of the outbreaks in herds has not been determined definitely, but in numerous instances the infection has been traced from farm to farm in the quarantined areas. No doubt the disease reached England in some way from the continent. Many believe that it was brought there by migratory birds, and Sir Stewart Stockman has suggested the possibility that particles of saliva from diseased animals may be carried across the Channel by the wind. The theory that it was carried to England in the clothing of soldiers returning from the continent seems to have few supporters.

The importation of such feeds as hay and straw originating on the continent is prohibited, but some believe that hay and straw used for packing crockery and other imported goods are possible sources of infection. It is said that such refuse as the bottoms of straw and hay stacks, to which animals had free access, is purchased for packing purposes and that when the goods are unpacked this soiled hay or straw is often disposed of to farmers or dairymen, who use it for bedding. Attention is also called to the fact that feathered game and poultry from countries where the disease exists are shipped to different parts of Great Britain for fattening or other purposes, and it is suggested that if infectious material can be carried by migratory birds, it might be carried on the feathers of game and poultry brought into the country.

The Channel Islands,¹ much closer to the infection on the continent, have escaped outbreaks while the disease has raged in England and Scotland. In this connection we understand that the authorities of the Channel Islands are very exacting in applying measures to prevent an invasion of the disease, even requiring that all boxes or crates containing pottery and other goods protected by hay or straw packing be unpacked at the docks on arrival and the packing material burned. They also require that all feathered game and poultry from a country infected with foot-and-mouth disease, upon arrival at any of the ports of the Channel Islands, be plucked and singed and the feathers burned at the pier.

It is understood that a British Departmental Committee is to be appointed for the purpose of investigating the origin of the present outbreak in Great Britain. The authorities, under the direction of Sir Stewart Stockman, have been giving much attention to the study of the origin of the outbreak. The veterinary profession of the United States and Canada will be deeply interested in the report of the committee.

It is believed that our import regulations are as effectual as practicable under existing commercial conditions, and they are being applied rigidly: but notwithstanding the protection afforded by this barrier, there are some sources of danger which are very difficult to guard against. For instance, it seems pos-

¹ Since this was written a report of the appearance of the disease on Sark Island has been received.

sible for the virus of the disease to be carried long distances in the clothing and belongings of immigrant farm laborers, or in hay and straw used as packing for crockery and other imported goods. We may consider ourselves fortunate to have escaped an invasion through these channels, exposed by commercial contact as we have been, especially since the war, to countries that are sources of danger. Therefore, it becomes necessary for the veterinarian and livestock owner to be eternally vigilant to detect promptly the first appearance of the disease, in order that it may be "nipped in the bud." All suspicious cases coming under observation should be immediately reported to the nearest Federal and State offices. Better make a thousand mistakes in reporting negative cases than fail to report one positive case.

Many cattle are now being imported into Mexico from South America owing to the very low prices for which they may be bought, and this opens up an additional possible channel of infection. As foot-and-mouth disease exists extensively in South America, infection is apt to be carried into Mexico. Since there is a possibility of the disease suddenly reaching the United States through infected cattle from South America, or Mexican cattle that have become infected from them, veterinarians and livestock raisers located in the Southwest are cautioned to keep in close touch with the condition and movement of cattle along the Mexican border in order to guard against an invasion of foot-and-mouth disease from that source.

Dr. T. E. Munce, President of the U. S. Live Stock Sanitary Association, has wisely appointed a committee to cooperate with the Bureau of Animal Industry in the protection of our livestock industry from an invasion of the disease, as it was felt that the Bureau should have the benefit of opinions and suggestions from sources outside of the Department of Agriculture. The committee appointed is as follows: E. S. Bayard, Chairman, J. H. McNeil, L. H. Howard, C. J. Marshall, V. A. Moore, A. J. Glover, S. E. Bennett, and H. R. Church.

LIVESTOCK CONDITIONS IN CANADA

THE VALUE of an organized veterinary sanitary body to the livestock interests of a country is well exemplified in the last report of the Veterinary Director General for Canada. This report shows very clearly that difficult problems associated with

the eradication of contagious diseases can be overcome, and success achieved, provided the active and most thorough cooperation of the livestock owner is obtained. It was possible with this cooperation to practically eradicate cattle mange in an area comprising approximately 74,900 square miles consisting of open prairie, scrub lands and cultivated sections, which had been under quarantine restrictions for this disease for a period of many years.

This report also shows that there has been no recurrence of dourine for two years, an epizootic which once threatened disaster to the largest horse-breeding territory in Canada. Glanders is also under complete control, this disease having been found in only three provinces of the Dominion, necessitating the slaughter of 59 horses.

The control of garbage feeders by a licensing system, and a systematic inspection of premises on which this material is fed to hogs, has, in view of the conditions existing in that country, justified the policy of controlling hog cholera without resorting to immunization by the simultaneous method. The prompt detection of this disease and efficient control have reduced the number of outbreaks of hog cholera to very reasonable limits.

The report shows one outbreak of anthrax, eight of sheep scab and ten of rabies. These outbreaks were promptly controlled and eradicated, and involved only a small number of animals.

It is quite evident that the Accredited Herds Plan and the Municipal Tuberculosis Order policies for the control and eradication of bovine tuberculosis are gaining in popularity with the Canadian livestock men. Their demands for assistance in this connection have been so numerous that the Health of Animals Branch have been unable to give all attention, owing to their limited staff and also to the limited amount of money appropriated for this purpose.

It seems unfortunate that after so many years of opposition on the part of the livestock owner to any suggested measures for the eradication of this disease there should be difficulty in obtaining sufficient funds to meet their more recent demands for the control and eradication of not only the most costly disease of all livestock, but also of one that is undoubtedly the greatest menace to the public welfare.

G. H.

RUNTY LIVESTOCK—CAUSE AND PREVENTION

AN INQUIRY recently made by the United States Department of Agriculture, on the cause of runty livestock, results in information of considerable interest to veterinarians. Nearly a thousand stockmen and breeders contributed their experiences in response to a questionnaire on the subject. The results are briefly as follows:

Inferior breeding, inadequate or unsuitable feed, and parasites are, in the order named, the three principal causes of runts, according to opinions of 783 stockmen. These causes are believed to be responsible for more than 75 per cent of runty animals. Other causes reported are lack of adequate housing and care, contagious diseases, exposure, accident, inbreeding, breeding immature animals, excessively large litters (swine), poor condition of the dam, and overcrowding at feed.

The most critical period in an animal's life, according to a summary of opinions, is just before and soon after weaning time. More than 85 per cent of runty animals become runty at this stage of growth. It is the time when the dam fails to supply the nourishment needed by a growing animal and when the young animal must learn to eat other feed. Greater care of livestock at weaning time and a study of the animal's feed requirements are desirable at this critical period in development. The proportion of animals which are runty at birth is only 4.4 per cent of the total.

Whether it pays to raise a runt to market size is a question that caused lively discussion. The runts which may be raised profitably, the evidence indicates, are those which are of good breeding. Even though an animal is small at birth it will grow as well as its larger brothers and sisters if given the proper care. Many stockmen told of experiences in developing excellent animals which had been small at birth, or which were only slightly stunted; but it seldom pays to give extra care and feed to a runt of inferior breeding.

There was a general agreement among livestock owners that a better understanding of the runt problem based on publicity and discussion will greatly reduce the proportion of undersized animals. According to the results of the inquiry about 7 per cent of livestock is in the runty class, and financial returns received from livestock of all kinds would be increased about 13 per cent if runts could be eliminated entirely.

Better breeding, especially the wider use of good purebred sires, was an outstanding topic of discussion. A farmer in Pulaski County, Va., where the "Better Sires—Better Stock" campaign has made much progress, writes: "Over 300 farmers in this county have pledged themselves to breed to nothing but purebred sires of any kind and have distributed good bulls over the county. In three years our cattle have improved from 50 to 75 per cent. The same can be said of sheep, hogs, and poultry. Don't breed runts and you won't have them."

Among poultry, runts are due to the same general reasons which cause them among the larger animals, but early hatching is an additional factor. The proportion of runts is very much larger among chicks hatched after the first of June. The reports of poultrymen corroborate the results of Government experiments on this subject.

An observation which makes the foregoing comments of significance to the veterinary profession is the rather subordinate position which disease occupies as a cause of undersized livestock. The results as reported, however, are based on the opinions of stockmen who probably are more familiar with feeding and breeding questions than with animal anatomy and pathology. The opinions of veterinarians on this subject are, therefore, invited. The estimated 7 per cent of runty animals in the total means between 10 and 15 million head of undersized livestock in the country. It is plainly a problem worthy of attention by the veterinary profession.

ANOTHER MISSTATEMENT EXPLODED

ON February 11 the following letter was received from L. A. Schmidt, D. V. M., West Point, Iowa:

Please find inclosed clipping from *Better Farming*, an agricultural paper published by Farm Press Publishing Company, 141 West Ohio St., Chicago, Ill.

Is it possible for a county agent to do testing for tuberculosis when we graduate veterinarians are required to take all state board examinations? It cost me almost \$50.00 last June to take the examination for accredited veterinarian. I wish to know whether or not the statement contained in this clipping is true.

The clipping is as follows:

TWO GOOD RECORDS

A total of 972 head of cattle in one locality were tested for tuberculosis in two weeks by County Agent D. B. Morris, Grand Forks, North Dakota. This is some activity and the agent has more than

one thing to do, you know. The cattle tested included 59 herds and only seven reacted showing the disease. This is a remarkable record. The seven head having tuberculosis were killed and the owners will be partially reimbursed for them from State and Federal funds. These tests were made as a part of the purebred sire campaign which is being staged in Grand Forks County by County Agent Morris.

The matter was taken up through Dr. H. H. Cohenour, inspector-in-charge, Bismarck, North Dakota, and in a letter he transmitted, dated February 15, Mr. Morris made the following reply:

Your letter written February 14 at hand, also information contained in a newspaper clipping which the Bureau of Animal Industry at Washington had sent you. I wish that you would advise me as far as possible where the clipping containing this information was secured. I certainly do not know where they got such information, as it never went out from this office. Last November Dr. Alfred M. Brolling (an approved veterinarian) conducted the tests as outlined in the article you inclose and in which I assisted him in lining up the different herds and furnishing transportation. As I remember it, I saw an article in one of the state papers, either the *Fargo Forum* or *Courier News*, which gave a synopsis of the tests as conducted, but the article didn't state that I did the testing as was outlined in the article you inclosed.

If possible I wish you would find out where this article appeared, and I will see that they hear from me and a correction made if possible. I want to give your department full credit for the good work you have done in this county and wish to express appreciation at this time for the cooperation you have given us.

The clipping referred to is an illustration of some of the erroneous statements that have been circulated relative to tuberculin testing being done by county farm bureau agents, with Government approval. It may be definitely stated that Federal funds are not being used for tuberculin testing by county agents, nor for indemnifying owners of reacting cattle, where the tests have been made by other than authorized veterinarians.

POINTS OF INJECTION IN IMMUNIZING SWINE

THOSE who are most familiar with hog cholera treatment are advising their colleagues to avoid injecting serum and virus into the muscles of the ham and shoulder in immunizing swine against cholera. Post-mortem inspection of swine injected at these points sometimes reveals deep-seated abscesses in the ham and shoulder. This results in losses through condemnations of meat, which can be avoided by making the injections at some other place.

The ham is a favorite place for making the injections because

they can be made more rapidly and easily at that point. The number of abscesses found in hams at packing houses indicates that some veterinarians, and many farmers who do their own immunizing, persist in making ham injections notwithstanding the information that has been already published on this subject. Those interested are advised to see to it that hog-cholera serum and virus are not injected into such valuable parts as hams and shoulders. Immunization can be accomplished with equal success when the serum is injected into less valuable parts of the animal.

In administering serum and virus the injections should be made into tissues that will absorb such liquids and at a place that will drain readily in case an abscess should form at the point of injection. Fat does not absorb serum readily; therefore the injections should not be made into masses of fatty tissue. The serous membrane lining the abdominal cavity absorbs liquids readily, but on account of the danger of puncturing the internal organs with the needle, and also the danger of carrying infection into the abdominal cavity, which might result in producing abscesses and peritonitis, abdominal injections as a general practice under present conditions are not recommended.

Probably the most satisfactory results in general field practice are obtained when serum is injected into the loose connective tissue of the axillary space or the flank. In making injections into the axillary space the front legs should be spread apart so as to stretch the superficial muscles between the legs, and the needle should be directed so as to avoid the muscles of the shoulder. Farmers' Bulletin 834, Hog Cholera, states:

This places the hog in a desirable position for making the injection between the foreleg and the body, which is regarded by many as the best location. Small pigs and shotes up to 75 or 80 pounds may be held up by the hind legs with the forefeet resting on the ground, and the injection made beneath the skin into the loose tissues of the flank. This is the most convenient way of handling a small pig, as it may be held by one man and is in a suitable position for taking the temperatures, cleansing the areas of operation, and making the injections. Injection into the ham should be avoided, particularly in grown hogs that are to be placed on the market before they have time to recover fully from the injection, as abscesses may develop and remain undiscovered until the ham is cooked and cut for use.

OBSERVATIONS OF VETERINARY PRACTICE¹

By J. V. LACROIX

Editor, The North American Veterinarian, Evanston, Illinois

AS with the practice of medicine, veterinary practice has its origin in empiricism. Without going into historical mention of the work, it is pertinent to remark that all who have been interested in veterinary science for fifteen or twenty-five years have noted many interesting developments in connection with the progress that has been made. This period has marked many notable changes in the nature of the work, due chiefly to discoveries regarding disease causes, prevention and treatment.

With the changes in the nature of veterinary practice there has come, perforce, a different attitude on the part of those engaged in the work, and to this is due the increasingly favorable esteem in which veterinarians and veterinary science are held by the public.

Even with a superficial examination of that which is touched upon in the foregoing, it is well to consider briefly the methods employed for training veterinary students in our schools and the activities of these men in practice after graduation. The change in the nature of veterinary practice and veterinary problems in other fields than that of practice has been so sudden and in some respects so radical that those who direct veterinary colleges and outline the scope of work that must be covered in order to meet demands are coping with problems the magnitude of which few others appreciate.

When, generally speaking, veterinary practice was equine practice, and exceptionally a bovine subject was presented for treatment, the course of training required to fit men for such work was comparatively simple. Then, as it is now, the study of anatomy was the foundation of a veterinary education; the horse was the logical type; students were required to become familiar with that which was in many respects the duty of artisans rather than of scientists. Great stress was placed upon clinical teachings, and the laboratory (exclusive of that for the study of anatomy) received little attention. The more suc-

¹ Presented at the meeting of the Ohio State Veterinary Medical Association, Columbus, Ohio, February 2, 1921.

cessful practitioners were horsemen or those who were sufficiently adept to become passably good horsemen. The examination of individual patients was the rule, and the need for keenly developed faculties for making physical examinations was imperative. Herd diseases were not so frequently dealt with as is the case today, and proficiency in the technic of autopsies was less essential than it is at present.

Those who received training along the lines just mentioned, and who have been in practice since, constitute a goodly portion of the practitioners of the country. The more successful are well established in their respective localities and are serving an appreciative clientele. They have had opportunity to progress with the times, and if they habitually meet and mingle with their confrères at society meetings, participate in postgraduate work in some measure and read veterinary literature regularly, they certainly have no cause to envy the more recently trained veterinarian who launches into practice. As a matter of fact, they have the advantage of a background supplied by years of experience that is invaluable and not to be acquired otherwise.

The veterinarian who has entered the field of practice during the last six or eight years has been regularly trained along all lines necessary to qualify him to cope quite successfully with the variety of problems that present themselves to the practitioner of today. He has advantages that are not possessed by many of those who have been in practice fifteen or twenty years, but owing to the different species of animals to be considered and the variety of diseases that all practitioners must treat now, it is fair to presume that he must lean on laboratory diagnosticians and call in counsel rather frequently or blunder.

During the last decade an influence has made its impression on veterinary practice in a way that is worthy of consideration. It is the purveyor to the veterinary practitioner, his laboratories for diagnostic work and the preparation of agents for use in disease prevention and treatment. This has materially contributed to the progress in veterinary practice that has marked the last decade. While credit is due others for the research work that resulted in the introduction of many of the biologic preparations now in use, we have to thank private enterprise and commercial rivalry for the perfection of these agents.

All of this has afforded opportunities for the practitioner's

success and made his work more interesting in many ways, but it has also put demands upon him that are not to be disregarded. These demands must be met by every practitioner, and the manner in which he comports himself determines the nature of his practice and largely the reputation he acquires. This responsibility resting upon veterinary practitioners imposes its exactions on the competent and the incompetent, the conscientious and the derelict. When a practitioner who is wholly unfamiliar with the anatomy of the porcine subject, untrained in pathology, and none too skillful in the technic of postmortem examinations, unaided, presumes to diagnose some atypical swine disease, he is consciously or unconsciously jeopardizing the interests of his client as much as does the more or less unpracticed youth who refuses to seek assistance in a difficult case of parturition.

Viewing the obligation as a whole, one must take into account the fact that, while the vast majority of us strive to measure up to requirements, there are those who are delinquent. And it is because of these exceptional cases that unfavorable criticism is made, and our profession as a whole must suffer, when it suffers.

Nothing in connection with veterinary practice has afforded as much opportunity for the practitioner to extend the scope of his usefulness and profit as a result than has the use of anti-hog-cholera serum. Hog cholera is a disease that has occasioned so much loss and been the cause of so much worry to such a large number of swine raisers of this country that when an agent for preventing the disease has been perfected, its use approved by science, and its almost infallible specificity widely advertised, veterinary practice is certain to be markedly influenced by this product and its administration. No ambitious practicing veterinarian while conducting his work is blind to opportunity for making legitimate pecuniary gain, and when this may be done in a dignified manner, even the ultra-ethical become interested.

But with the advent of anti-hog-cholera serum, obligations and responsibilities have been saddled upon the practitioner of a nature such as he had never before experienced. With few exceptions, practitioners have conscientiously assumed responsibilities thus imposed and have labored faithfully to equip them-

selves to meet the specific and newly imposed demands. In the performance of their functions in this work practitioners have adopted various methods, and, generally speaking, results have been in keeping with the methods employed.

Veterinary practice that is related to the use of anti-hog-cholera serum is given specific consideration in these observations because of its economic importance to the practitioner and client, and furthermore, because fundamentally this particular kind of practice differs in no wise from other practice as it impresses the client and reflects upon the veterinarian.

Approximately five hundred million cubic centimeters of anti-hog-cholera serum is used in this country every year. Estimating that 50 c.c. is the average quantity given each hog, only about 10,000,000 swine are treated annually. In recent years, according to Federal crop estimates, there were approximately 70,000,000 hogs in the country on January 1 of each year. This would indicate that about 14 per cent of swine are immunized against cholera. According to some whose business it is to give such matters chief consideration, if all the swine of this country were given serum, cholera would not be eliminated; it would simply be made impotent and kill but few hogs one season, only to become more fatal as soon as the use of serum was discontinued.

Like insurance, swine vaccination can not be allowed to lapse. And the use of anti-hog-cholera serum, with all that is related to it, as it concerns the veterinary practitioner, always ought to be considered insurance against loss for the client. The insured pays the premium, the practitioner is agent and director, and the serum may be likened unto the principal of the policy.

In the estimation of many practicing veterinarians, methods employed in swine vaccination and all that is directly related to the work largely determine the attitude of clients. In some communities farmers with propensities for doing their own veterinary work as well as that of their neighbors when possible have agitated the matter of special legislation for providing means for hog owners to do their vaccination without veterinary service. Other agencies have been active in promoting the idea of "farmer vaccination." In one Iowa county 105 farmers recently took the course of instruction given for the administration of anti-hog-cholera serum. This is not representative of all parts

of the State, according to the information received, but is perhaps the largest class to which instruction has been given.

It is not the purpose of these remarks to consider the various aspects of the problem which confronts Iowa practitioners, but in passing it may be said that while swine vaccination by laymen can not prove practicable in the long run, and comparatively few farmers will find it satisfactory to continue the work after they start, it is certain to encourage quackery.

Careful investigation of the subject in several of the Corn Belt States reveals the fact that where dissatisfaction occasions any considerable trouble for many, it is due to excessive charges made by those who purchase serum for the lowest possible price and collect for their services by rendering a bill for serum used at a price that is known to be unfair and unreasonable. It is thought that the activities of such practitioners, with the charges made by their clients, when exhibited before the Iowa legislators and supported by indisputable evidence, were largely responsible for the enactment of the law which provides for giving license to laymen to administer anti-hog-cholera serum in that State. It is not intended in making this statement to convey the impression that nothing else of an undesirable nature enters in causing dissatisfaction. Also we must consider the fact that there are some very able and successful practitioners who base their charges for service rendered for swine vaccination upon the quantity of serum employed, making additional charge only when few animals are treated or where comparatively great distances are travelled especially to do the work.

However, it does not follow that because a veterinarian who is well established as a practitioner, who has earned the confidence of a large clientele, may collect for service rendered for swine vaccination by charging a profit on serum administered, this method is calculated to prove practical in the hands of the average practitioner. It is necessary that the veterinarian charge his clients for the serum he administers, and he must allow himself a margin for handling the serum; but the service he renders really constitutes that for which he makes a charge; otherwise he is apt to be considered a middleman or a merchandizer, and that role may be played by any layman. Any intelligent layman is capable of discharging the contents of a hypodermic syringe into the tissues of an animal when the subject

is properly confined, and when serum administration becomes largely a contest against time, where charges are based largely upon quantity employed, it is no wonder that fault is to be found by those who pay the bills.

Such methods are deplored by every conscientious practitioner, and unless the dissatisfied and disgruntled clients are given encouragement by "pirate" serum dealers and ill-advised county agents, the good influence lent by those who constitute veterinary organizations such as this will forestall any legislation that hampers the practitioner in the discharge of his duties.

ACCURATE THERMOMETERS DEMANDED

Of 22,000 thermometers tested during 1921 by the Bureau of Standards, 95 per cent were tested for practicing veterinarians, the remaining 5 per cent being for other doctors (human use). The proportion was especially striking in one State last year where 2,000 thermometers were tested for veterinarians as compared with 12 for doctors.

This brings out the noticeable desire of the veterinary profession for accurate instruments. Of course, veterinarians no doubt break a great many more thermometers than other doctors do and probably the great quantity of tuberculin testing is responsible for the large number of thermometers tested for veterinary use. Notwithstanding these qualifications the figures are rather interesting.

A referendum on the use of alcohol in medical practice, recently conducted by the American Medical Association, indicates that the physicians of the United States are about equally divided on the question of prescribing whiskey. Replies to questionnaires were received from 31,115 physicians. To the question, "Do you regard whiskey as a necessary therapeutic agent in the practice of medicine?" 51 per cent answered yes and 49 per cent no. The vote on beer was 74 per cent negative, and on wine 68 per cent negative. Sentiment in favor of the medicinal use of alcoholic liquors was stronger in the cities than in rural districts.

BOVINE INFECTIOUS ABORTION¹

By M. F. BARNES

Pennsylvania Bureau of Animal Industry, Harrisburg, Pa.

CONSIDERABLE WRITING was done relative to abortion of cattle during the first part of the nineteenth century, and it was recognized at that time that its cause was transmissible from one animal to another. It was not until almost a century later that its cause was discovered and the opinion by many that it was due to witchery, evil spirits, climatic conditions, fright, smells, etc., was abolished.

The widespread occurrence of bovine infectious abortion, its spread in a country and from one country to another, has been synchronous with the improvement of purebred breeds of cattle due to the movement of cattle for breeding purposes from one part of a country to another and from one country to another.

Not much more than a decade ago there had not been developed any reliable methods whereby it could be determined what animals were infected with *Bacterium abortus* Bang, but in recent years reliable tests have been developed and by their application the spread of abortion disease through the introduction of infected animals should be controlled.

The presence of abortion disease in a herd under usual conditions is not shown until its most characteristic symptom, namely, an abortion, has occurred. The losses encountered can be best related by those who have experienced a scourge of its ravages.

The number of abortions in cattle due to organisms other than *Bacterium abortus* Bang is believed to be less than 1 per cent. This belief is based on data collected from a large number of herds which were negative to tests for bovine infectious abortion, also to some extent from herds infected with the latter disease. However, there are other exceptional or unusual conditions and acute diseases which may cause contraction of the uterus and expulsion of the fetus.

PENNSYLVANIA'S BOVINE ABORTION POLICY

The history of abortion and attempts to remedy it in Pennsylvania are probably just as complete as those of any other State

¹ Presented at the thirty-ninth annual convention of the Pennsylvania Veterinary Medical Association, Harrisburg, Pa., January 25, 1922.

or any nation. Bovine abortion was recognized as epizootic in nature because the cause was discovered. Hudecoper in 1895 divided abortion of cattle into contagious and sporadic. He appreciated that the number of abortions which did not belong to the transmissible class was small. Since 1896, when Prof. Bang discovered the cause of transmissible bovine abortion, Pearson, Gilliland, Klein, C. J. Marshall and Munce have had to do with Pennsylvania's bovine abortion policy.

Soon after 1896 Pearson formulated a plan for the suppression of that disease which consisted principally of isolation, sanitation and disinfection. The plan was almost as complete as what we can recommend today. Most attention was given to the treatment of animals after they had aborted, and many things which are known at the present time concerning the nature of the disease were not known at that time. In conclusion with other measures the carbolic acid method of treatment of pregnant cows was given a thorough trial, and in many instances the results obtained were apparently in its favor, more so than any of the present-day published results of the use of vaccine will show; but it finally developed that the carbolic treatment was of no value.

During the period from 1896 to 1911 it was believed, on the basis of the number of reports of the presence of the disease, that abortion in Pennsylvania was becoming less prevalent each year. During that period it was thought that sanitary measures were effectual.

In 1911, during Marshall's occupancy of the chair of State Veterinarian, a more extensive study was commenced. It was learned that the disease was more prevalent than had been previously supposed. An attempt was made to find better diagnostic measures, and during the same year Meyer established the complement-fixation and agglutination tests as a part of our laboratory routine for the diagnosis of this disease. He also made an extended study of the cause and was probably the first in Pennsylvania to demonstrate *Bacterium abortus* Bang as the widespread cause of bovine abortion in this State.

In 1912 Meyer prepared abortin and it was used on several herds to determine its value as a diagnostic agent. Its use was attended with more labor, more disturbance of the animal, it did

not seem to be as accurate as the blood tests, and its use was discontinued after an extended experimental study of its value.

In 1913-1914 methylene blue was given a thorough trial and was shown to be of no value as a preventive.

About this time it was becoming noticed that the losses due to sterility in abortion-infected herds were quite large, and in 1916 the Albrechtsen uterine douche treatment was begun by Ridge as a part of the Bureau's field investigational work, with the object of determining its value in the prevention of sterility and if it would lessen to any extent the number of abortions. Other methods of treating genital defects were used in conjunction with it. The Bureau then gave demonstrations to veterinarians of the method of employing this treatment, and at the present time demonstrates to only those veterinarians who ask for a demonstration.

About two years ago the Bureau started a more concentrated study of this disease with the hope of developing a concrete and practical method for its control.

In May, 1920, work was begun with a mixture of strains of *B. abortus* Bang of bovine origin, to determine the value of vaccination of nonpregnant animals at least 60 days prior to breeding, with a saline emulsion of a living culture of these mixed strains administered in large dosage.

The Pennsylvania Bureau of Animal Industry ever since its organization has constantly studied this disease, always with the hope that suitable methods of control would be devised. Had stockmen been made to realize the importance of precaution the efforts of the Bureau and other organizations working for a similar purpose would undoubtedly within the past twenty years have solved the abortion question. The task would not have been easy, for nothing worth while is easy. It is not too late now to begin a sane policy.

The nature of bovine infectious abortion is such that to prevent its occurrence requires most constant and diligent perseverance. It is not like anthrax, blackleg, etc., occurring only in certain seasons. Pregnant animals are said to be the most susceptible, and in most working herds this class of animals is always present, therefore in infected herds where cows are calving during every season of the year infection is always present. Where heifers are arriving at the breeding age and in herds where new

animals are constantly being purchased, susceptible animals are always present, thus the infection is kept alive.

The members of this Association are sufficiently familiar with the nature of abortion and its symptoms that it is unnecessary to discuss those features at this time.

The study of methods for the control of bovine infectious abortion has been an eliminative study, and before we get on a sane and sound basis it seems it will be necessary to do more eliminating.

There never has been found any successful method for the treatment of this disease. It is believed, on the basis of what has been learned by the numerous investigators of recent years, and on the basis of what practical experience and the practical application of certain principles have taught us, that the disease can be successfully prevented and controlled, and therefore it is suggested that veterinarians recommend the following principles to stockmen:

RECOMMENDATIONS FOR THE PREVENTION AND CONTROL OF BOVINE INFECTIOUS ABORTION

1. Breed and raise your own animals.
2. Make improvements in bloodlines as much as possible by careful selection from within the herd rather than from outside sources, thus excluding outside infection.
3. Every cow in every herd should be handled with as much precaution as though she were known to be infected.
4. There should be provided on every farm a separate stall or stable known as a maternity barn, for cows at calving time. This stable should be so constructed that it can be easily disinfected, or better, fumigated with formaldehyde. On farms containing a large number of cows it should have a sufficient number of completely separated stalls to accommodate the number of cows that would be calving at one time.
5. Every cow should be removed from the herd at calving time and placed in the maternity stable.
6. Every cow showing symptoms of abortion should be placed in the maternity stable.
7. Every cow placed in the maternity stable should be kept there until all discharge has ceased and the uterus has been properly treated and has been determined clean by examination.

8. All afterbirths and aborted or dead calves should be well buried or burned immediately.

9. The maternity stall should be well cleaned and effectively disinfected, or preferably fumigated, before another cow goes into it. The manure and litter should not be placed in the exercise or feed yards.

10. Each pregnant cow, in either pasture or stable, should be seen by the herdsman every day. Any showing symptoms of abortion or nearing normal calving time should be removed to the maternity barn.

11. If purchases are to be made the history of the herd from which one wishes to purchase and the individual animal history should be determined, and if either is doubtful the purchase should not be made until the animal's health is definitely determined, and even then it is safer to purchase from healthy herds.

12. All newly purchased animals should be isolated for a period. All known reliable tests for the determination of their health should be applied.

13. Bulls and unbred heifers are said to be the safest animals to buy, but these should be isolated for a period, and should have passed the blood test for bovine infectious abortion before they are incorporated into the main herd.

14. Pregnant animals should not be purchased unless they are isolated until they have given birth to a normal calf, have passed a satisfactory blood test not within two weeks after having given birth to the normal calf, the uterus has been properly treated and has been determined clean by examination.

15. Any cows that have ever left the farm should be returned only under the same conditions as newly purchased animals.

16 Herd bulls should not be used for service to neighbors' cows.

17. In case an abortion has occurred in the stable the cow should immediately be isolated, the fetus and membranes buried or burned, and the stable well cleaned and disinfected. An abortion occurring in the pasture field should be handled in the same way. The earth at the point should be covered with three or four inches of lime or a strong disinfectant or both.

18. Consider every case of abortion infectious until otherwise determined.

19. See that the herd is given good, clean feed and water.

20. Feed should be obtained from such sources and should be so stored that it will be insured against contamination with disease-producing organisms.

21. Do not allow calves to tramp over feed for the cows. Suckling calves from infected mothers are considered spreaders of bovine infectious abortion.

22. Do not feed unsterilized milk from herds where abortion exists or from creameries to cows or sows. Sows are susceptible to infection with *Bacterium abortus* Bang.

23. Manure piles should not be in the exercise or feed yards.

24. No cow should have access to manure piles at any time.

25. Members of bull clubs should exercise extreme precautions as pertains to abortion and other transmissible diseases. Bull clubs should be considered as consisting of units and handled as one herd.

26. Do not permit any person to inject a vaccine or serum to prevent abortion unless it has been generally recognized of value and has been approved by the State official charged with the prevention, control and eradication of transmissible animal diseases.

27. A living culture anti-bovine infectious abortion vaccine, administered in large dosage, is believed by some to be of some value in the immediate infected herd, but its merits have not been sufficiently proved to recommend its use in other than very badly infected herds, and even then it is doubtful if its merits are sufficient to rank it higher than the above precautions properly executed. It has been proved that it does not do damage. It should be used only experimentally under official supervision.

THE BLOOD TEST FOR BACTERIUM ABORTUS BANG INFECTION

The blood test for bovine infectious abortion has been so perfected that when properly applied we believe it is nearly 100 per cent accurate in picking out infected animals.

The two tests most commonly used are the agglutination and the complement-fixation. One seems to be just as accurate as the other. A reaction to either or both tests does not indicate that an animal has aborted or that it will abort. It does indicate infection with *Bacterium abortus* Bang. Neither test may pick out recently infected animals. It would, therefore, be nec-

essary to repeat the test in thirty to sixty days to find animals in which the disease was in the incubative stage at the time of the first test.

The test is of practical value for establishing a diagnosis of infection in a herd; for determining the extent of infection in that herd; for testing animals to be added to clean herds; and where facilities exist, for dividing a herd into a reacting and a clean herd.

The summary given below of the percentage of reactors among the different classes of bovine animals according to age and sex represents the results of tests on sera collected from animals in extensively infected herds. Infection with *B. abortus* Bang had been present in these herds for periods ranging from six months to approximately fifteen years, with an average existence of infection for approximately four years.

Results of Blood Tests in Badly Infected Herds

Four hundred and twenty mature females in 9 herds showed 223 reactors, or 53 per cent.

Eighty-two unbred heifers over 1 year of age in 7 herds showed 11 reactors, or 13.4 per cent.

Twenty-six females between 6 months and 1 year of age in 5 herds showed 5 reactors, or 19 per cent.

Twenty females under 6 months of age in 5 herds showed 4 reactors, or 20 per cent.

Sixteen mature bulls in 6 herds showed 6 reactors, or 37.5 per cent.

Eleven males under 6 months of age in 5 herds showed 3 reactors, or 25 per cent.

THE HERD BULL

The part played by the bull in the spread of bovine infectious abortion from one animal to another is not clearly understood. His relation to the spread of this disease probably depends to a large extent upon whether he is infected or not.

INFECTED BULLS

Experiments conducted by Schroeder would seem to indicate that the bull, whether infected or not infected, does not play much of a part in the transmission of abortion. However, similar experiments should be conducted on a large scale including a large number of infected bulls. If infection in cows can not be produced by the introduction of the abortion organisms through the vagina, as Schroeder's experiments seem to indicate, then cows served on neutral ground to infected bulls would not become infected.

Bulls' semen containing *B. abortus* Bang should be considered just as dangerous as any other material containing that organism, and if cows can become infected only through the mouth as a channel, the pasture, feed and water contaminated with semen from reacting bulls, as well as when contaminated with the organism derived from other sources, should be kept from the mouths of cattle. Reacting bulls should not be pastured with nonreacting cows. Cows which have been served by reacting bulls should not be placed in free contact with nonreacting cattle for considerable time after service. Material containing the organism which has dribbled from the vagina to the ground could be taken into the mouth by the same cow from which it dropped or by other cows.

Bulls may be more susceptible to infection than we have formerly believed. Just what conditions are necessary for bulls to become infected, the channel of infection, and what percentage of them discharge *B. abortus* with the semen have not been conclusively determined.

While cows usually become infected through ingestion of *B. abortus*, it has not been proved that there are not certain percentages which become infected through the vagina and through the teat canal.

If infected bulls are a factor in the spread of bovine infectious abortion and it is through the presence of the organism in their semen that they become a factor, then to douche their sheaths either before or after service would be of no avail in prevention of the spread of the disease.

NONINFECTED BULLS

Nonreacting bulls which are allowed to serve only nonreacting cows can do no harm. Nonreacting bulls which are permitted to serve reacting cows only after the genital tract of the latter are clean and free from discharge should not transmit the disease when used on healthy cows. Since *B. abortus* can seldom be found in the genital tract of cows for more than from thirty to sixty days after calving, the practice of serving cows after that time should be safe so far as transmission of infectious abortion by the bull is concerned. Some good breeders have stated that cows which have aborted should not be served until after the time the calf would have been born had it been carried

to maturity. Others want the cow to conceive again as soon as possible after the occurrence of an abortion. The Pennsylvania Bureau of Animal Industry has always advised that cows be held for considerable time after an abortion before being served. Pearson, in his outline for the control of abortion stated that ten weeks was the proper length of time. If the genital tract is in the proper condition when a cow is served there should be no necessity for douching the sheath of the bull. If the genital tract of the cow is not in the proper condition and contains *B. abortus* Bang, to douche the sheath of the bull after being used for service may prevent him from becoming infected.

ANTI-BOVINE INFECTIOUS ABORTION VACCINATION

It was stated above that the Pennsylvania Bureau of Animal Industry had begun the use of a living-culture vaccine in May, 1920. Since the beginning of this work there has been a total of between 275 and 300 heifers and mature cows vaccinated at least sixty days prior to breeding, in a total of ten badly infected herds situated in several sections of the State. There has been a total of approximately 250 to 275 heifers and cows left as controls. The work has not progressed to the point that a final report can be rendered at this time. The vaccine is kept at refrigerator temperature and has been used at different ages, ranging from a freshly prepared saline emulsion of *B. abortus* (several strains) to an emulsion three to four months of age. It is tested culturally to determine that the organisms are alive before being used for vaccination. The dose has usually been between 600,000,000,000 and 1,000,000,000,000 organisms, although this dosage has been considerably decreased for some cows and considerably increased for others.

The following results are not intended as a final report of this work, nor as a final report of the herd from which they were obtained, because there are considerable data pertaining to them which have not been summarized.

HERD No. 1

Twenty unbred heifers separated from the main herd were blood tested for bovine infectious abortion with the result that all were negative. Ten of these heifers were vaccinated with a freshly prepared living-culture vaccine, placed in the main herd.

and bred in from 6 to 120 days. One of these was sold and the breeding record could not be obtained. Another has not conceived. This leaves a balance of eight vaccinated heifers. Three of the eight aborted, and five calved at full time.

Five of the twenty heifers were placed in the main (infected) herd as controls and were bred in from 40 to 120 days. One of the five has not conceived, which leaves only four, all of which calved normally.

The remaining five of the twenty were kept separated from the infected herd. All five conceived and calved normally.

The main herd had been infected for seven to eight years. During the period of this experiment there were approximately fifty conceptions in the herd, including those of the fifteen heifers. There were eleven or twelve abortions.

Main Herd Including Added Heifers

Number conceived	50
Number abortions	12
Per cent abortions (approximate).....	25
Per cent normal births (approximate).....	75

Heifers Vaccinated and Exposed

Number conceived	8
Number abortions	3
Per cent abortions	37.5
Per cent normal births	62.5

Heifers Exposed as Controls

Number conceived	4
Number abortions	0
Per cent abortions	0
Per cent normal births	100

HERD NO. 3

The herd consists of 70 to 75 females of breeding age and has been infected for five years. The entire herd was blood tested.

Six unbred heifers and one three-months pregnant heifer were vaccinated with a freshly prepared living-culture vaccine. It was not remembered by the herdsman at the time that the pregnant heifer had been bred. She was negative to the blood test at the time of vaccination and carried her calf to maturity. This leaves a balance of only six heifers, the results of which are as follows: Heifer 6-IIe was positive to the blood test before vaccination and the other five were negative.

No. 1-V. Conceived 67 days after vaccination. Aborted at 4 months.

No. 2-Ho. Conceived 114 days after vaccination. Aborted at 6 months.

No. 3-L. Bred 150 days after vaccination and afterwards showed no signs of estrum. Thought to be pregnant until determined that she was not. This is unusual for heifers the age of this one. She may have aborted in the pasture unnoticed.

No. 4-MG. Conceived 150 days after vaccination. Calved normally.

No. 5-D. Conceived 109 days after vaccination. Calved normal time. Calf died.

No. 6-He. Conceived 103 days after vaccination. Calved normally.

6 minus 1 (3-L) equals 5.

Two of the 5 aborted equals 40 per cent.

Data pertaining to the entire herd have not been summarized, but it is known that the number of abortions during the period of this experiment was small—less than 10 per cent. More than 40 per cent of the cattle of breeding age reacted to the blood test.

CONCLUSIONS

Abortion disease for a long time has been recognized as a transmissible disease of cattle.

Its widespread occurrence has been synchronous with improvement of purebred breeds of cattle.

Accurate methods for determining if animals are infected with *Bacterium abortus* Bang are of comparatively recent development.

It is usually not recognized clinically until an abortion has occurred, and therefore often not until considerable damage has been done.

The amount of loss caused would be difficult to estimate.

The number of abortions of cattle due to causes other than *B. abortus* Bang is comparatively small.

It has been as extensively studied in Pennsylvania as elsewhere.

Breeders as a rule have not been sufficiently concerned in its prevention.

Its nature is such that the usual method of herd management would tend to keep active instead of eliminate its cause.

To install effectual prevention and control measures universally, it will be necessary, first, to eliminate supposed remedies and propaganda pertaining thereto.

The practical application of certain principles indicates that abortion can be prevented and controlled.

The blood tests properly applied are practical and dependable.

The part played by the bull in the transmission of *B. abortus* is not thoroughly understood and should be considerably studied.

Anti-bovine infectious abortion living-culture vaccines are still in the experimental stage and may do more harm than good. Their distribution should be regulated by law.

The writer is indebted to Dr. E. L. Stubbs for conducting laboratory work on blood tests, and to the several veterinarians and stockmen who have made possible and supported our work. Continued interest and support are solicited, with the expectation that the work of the Bureau on this disease will be of universal benefit to stockmen of the future.

JUBILEE OF PROFESSOR PERRONCITO

The Second Congress of Comparative Pathology will be opened at Rome, in September, 1922, presided over by one of our honorary members, Prof. Dr. Edward Perroncito, whose Jubilee will also be celebrated at Turin about the same time, since the Doctor is about to retire from teaching at the University, because of age limit.

The Directing Council of the International Museum of Apiculture and Silkworm Culture of Turin, in honor of its founder and president, Professor Perroncito, to whom is due the discovery of the disease suffered by the miners of St. Gothard, has addressed the many friends of the illustrious Professor, in order that their united efforts may make it possible to put into execution the project to establish new quarters for the Museum to bear the name of its founder—"Perroncito Museum."

The proposal to make the study of the English language compulsory in the preparatory schools of Germany calls forth this expression from the *Münchener Medizinische Wochenschrift*: "Since scientific research in the United States has made such advances, thanks to the wealth of the country, and American literature is on the point of taking the lead in medicine, a knowledge of English has become indispensable for the research worker." Hitherto the study of English in the German schools has been optional, while French has been compulsory.

A STUDY OF SO-CALLED KENNEL LAMENESS: PRELIMINARY REPORT¹

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FOR SEVERAL YEARS one of us (Brimhall) has observed a condition which occurs spontaneously in dogs and for want of a better name and an opportunity to make a complete study of its occurrence, etiology, and pathology has been named "rheumatism" or "kennel lameness." The earlier observations with other more recent data are presented here. Besides several characteristics common to these diseases, there is softening and deforming of certain bone structures approximating a condition of osteomalacia but with several differences. For this reason we have chosen to describe the disease under an indefinite name until the completion of studies which may permit an accurate definition.

The condition was noticed first in the winter of 1916-1917. It is apparently common to a certain percentage of dogs under observation in kennels for periods ranging from several weeks to several months and in a few cases for one or more years. It is characterized by a gradually increasing stiffness in gait, and if allowed to progress it results in marked softening and deformity of bone, which is limited to the ribs, scapula, pelvis and vertebrae. In the beginning, affected dogs show a slight stiffness in moving about, which does not disappear with exercise, and they may or may not evince pain by flinching, whining or yelping when moving quickly or when picked up or otherwise handled. The stiffness gradually becomes more marked; there is loss of weight in spite of unimpaired appetite; muscle atrophy develops, and after several weeks or months the skeletal deformities appear. Of the latter, those to be observed ante mortem are confined to the ribs, which show multiple nodule formation and may bulge either in or out, resulting in considerable distortion of the chest wall. In some cases a depression runs transversely or diagonally to the long axis of the ribs in which two or three fingers might be laid. The back is usually

¹ Presented before the twenty-fifth annual meeting of the Minnesota State Veterinary Medical Association, St. Paul, January, 1922.

arched, excessively in some cases, and the abdomen has a tense, "tucked-up" appearance. The animals are disinclined to move about, the hair coat is rough and lusterless, and in a number of advanced cases in male dogs the penis protrudes and becomes dry and somewhat shrunken from constant exposure. Occasionally a purulent conjunctivitis or ulcerative keratitis is present; these complications, however, yield to treatment or heal spontaneously, and their course has been found to be quite independent of the major condition except so far as the debilitated condition of the animal favors their onset.

GROSS PATHOLOGY

The most striking features of the disease are seen at necropsy. In old cases the ribs, scapula, pelvis, and vertebræ are softened so that they can be cut with a knife quite easily. The ribs are bent and twisted, with single or multiple nodule formations throughout their length. In mild or early cases which come to necropsy only an occasional rib may show this characteristic formation of nodules, but in severe or long-standing cases practically every rib has from one to three nodules as though the bone had been fractured and repair had taken place (fig. 1).



Fig. 1.—Typical rib nodules and thickening of the spinous processes of the first four thoracic vertebræ. The shaft of the right ilium also shows the rough callus.

However, actual fracture has not been observed ante mortem or at necropsy. The nodules involve the entire thickness of the ribs and may be located near the vertebral articulation, near the costochondral juncture, or between these points; rarely, if ever, are the articulations themselves involved as in rickets. The scapula cuts readily, and if dissected free of muscle tissue and allowed to dry it shows further evidence of softening by bending and otherwise failing to retain its shape. The pelvic bones show a constant lesion in that the shafts of both iliums, sometimes only one, are thickened and rough, giving the impression of fracture with callus (fig. 2). Here again we have not ob-



Fig. 2.—Normal pelvis (left) and diseased pelvis (right). The shafts of the iliums show marked differences.

served positive evidence of fracture, either ante mortem or at necropsy. However, in ribs and pelvis the possibility of partial fractures which may have stimulated the processes is admitted. In fact, roentgen-ray examination of some affected dogs demonstrated that a condition approximating fracture may be present in some cases. The vertebræ are markedly soft in old cases; but

only rarely are there other gross changes. The comparative ease with which even the bodies of these normally very hard bones are cut through will probably impress those who have occasion to remove spinal cords at necropsy. Rarely we have seen a callus-like thickening on the ventral surface of a few vertebræ, a thickening of some of the spinous processes (fig. 1), and in a few cases in which the spinal column showed marked kyphosis we found two adjacent vertebræ impacted and partially ankylosed.

Softening or deformity of the long bones of the legs, or bulging or other deformity of the cranial bones, has not been observed. In a very few cases we have detected a thinning of the cortical compact bone substance of the femur, and in one case, while dissecting out the femur, the anatomic head of this bone fractured completely without unusual traction. Otherwise neither the epiphyses of the long bones nor their articular surfaces have been involved.

Grossly, the marrow of affected bones falls into one of two groups. In the first the marrow is deep wine-red or light purple, highly vascular and full of fluid; in the second group the marrow is quite pale, apparently less vascular than normal, and rather dry. In cutting through a rib nodule or through the callus on a pelvic bone the same groups are evident with still another one in which the entire surface of the bone appears white, bloodless, of uniform texture and devoid of marrow space.

Microscopically, the appearance of the marrows agrees with what is seen grossly. As the plates show, there is a marked decrease in the compact bone substance of the cortex and trabeculae of the ribs (figs. 3 and 4). A complete report of the histopathology of affected bones cannot be given at this time, inasmuch as this phase is still being studied. It is certain, however, that the cellular elements of the diseased bone marrows will show some striking differences compared with the normal.

ETIOLOGIC FACTORS

The etiology of this disease offers considerable ground for speculation, and controlled experiments are at present under way which, it is hoped, will throw light on the matter. It should be emphasized, however, that this condition occurs almost

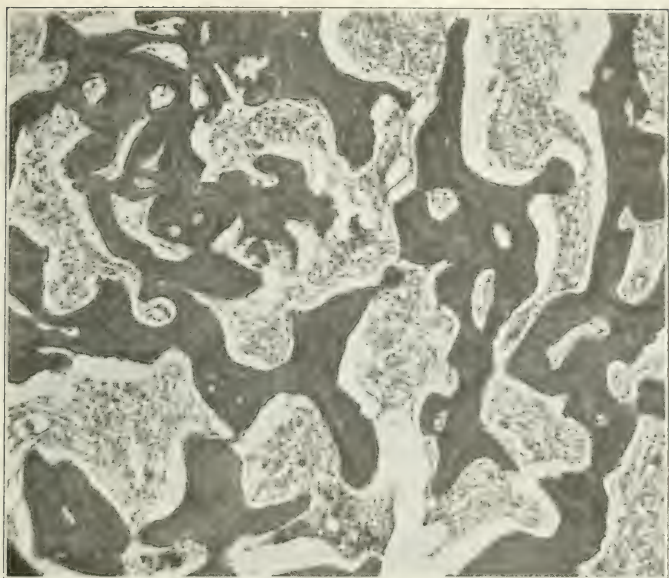


Fig. 3.—Marrow of normal rib. Note the amount of compact bone substance in the trabeculae and compare with figure 4. (X 50.)

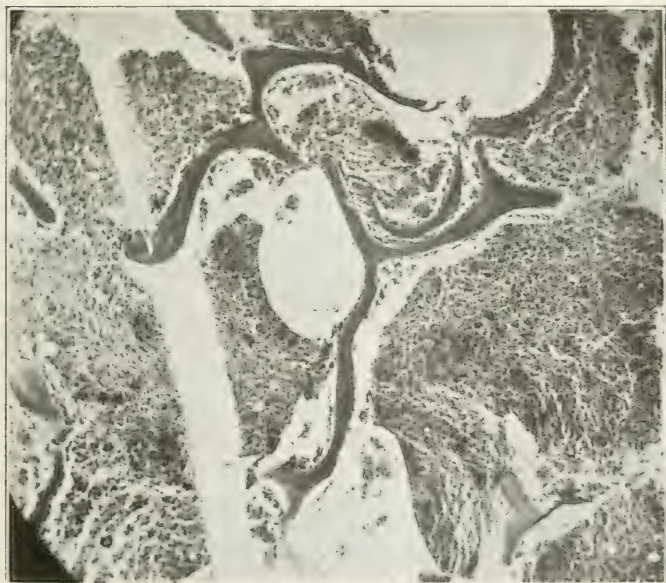


Fig. 4.—Marrow of diseased rib. The compact bone substance is present in about one-tenth the amount shown in the normal. (X 50.)

without exception in mature dogs and should not be confused with rickets.

When the bone changes were noted several years ago they were not associated at first with the condition designated as rheumatism or kennel lameness, which was present in some of the dogs at that time. The lesions were first noticed in a series of dogs that had been subjected to considerable roentgen-ray treatment, and it was thought that the excessive application might be responsible. For some months afterward, a like condition was not observed, although the average number of dogs with rheumatism was noted. Drug treatment for the condition met with indifferent success, although isolated cases showed marked improvement.

In the winter of 1917-1918 animals with lameness were given large quantities of horse meat, besides the regular diet of dog biscuit. They all improved greatly and the majority recovered completely and remained in good condition while under observation, from one to two years. During this period bone changes were found in dogs with rheumatism and the two conditions were definitely associated. The possible etiologic relationship of a deficient diet was then recognized, although the exact nature of the deficiency is still somewhat obscure.

The routine diet of kenneled dogs has consisted, for several years, of dog biscuits broken up and fed in hoppers, so that in many cases the dogs always have food before them. In addition whole milk or buttermilk has been fed to dogs whose condition seemed to require it. For several years horse meat has been fed in considerable amounts during the winter months, but only as an adjunct to, and not to replace, the regular diet of biscuits.

At least three possibilities must be considered with regard to the relationship of the diet to a nutritional disturbance resulting in the so-called kennel lameness. First, a deficiency of lime in the food, or a metabolic disturbance which either interferes with the proper assimilation of lime or favors the resorption of lime salts from the bone tissues, with a resultant osteomalacia; second, a vitamin deficiency which may be responsible for the metabolic disturbance, and third, bacterial invasion.

Hutyra and Marek assert that osteomalacia in dogs is seen only in exceptional cases, while Muller and Glass question the

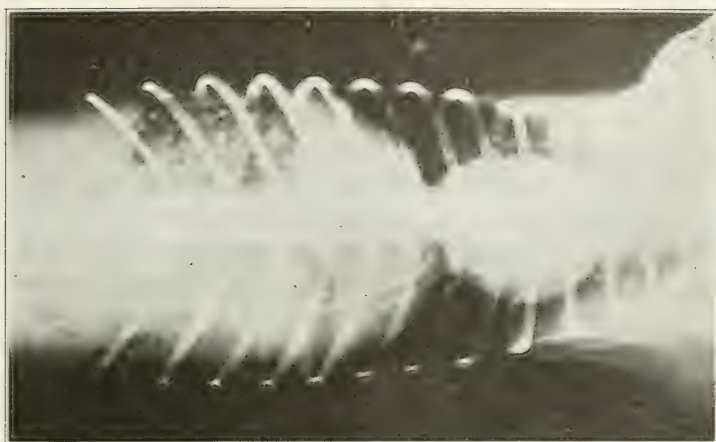


Fig. 5.—Thorax of normal dog.

occurrence of true osteomalacia in these animals. However, the symptoms and pathology of this kennel lameness point essentially to osteomalacia within the general meaning of that term. Since in the latter disease a lime deficiency has always been considered a prime factor, we are at a loss to associate certain phases of the kennel lameness with an actual poverty of lime in the food. The drinking water to which the dogs always have access is very hard and consequently rich in calcium salts. Furthermore, we have recently had a typical case of the disease come to necropsy in which the dog, during the course of an-



Fig. 6.—Thorax of diseased dog. Note the poor delineation of the ribs (due to lack of salts?) compared with the normal. The nodules and the bent and twisted appearance characteristic of the condition described are shown.

other experiment, had been receiving calcium salts far in excess of his bodily needs. In this case, however, as well as with the drinking water, we have no definite assurance that the calcium taken into the organism is in a suitable state for assimilation. Lastly, it seems that if lime deficiency is the cause, we should have a greater percentage of cases than has been thus far observed. It has been noted in only 15 per cent of the dogs under observation. Recently the incidence was found to be 10 per cent, and it is interesting to note that this reduction occurred in three months during which horse meat had been fed quite regularly with the regular diet.

Steenbock and his co-workers, in reporting an ophthalmic disease seen in dogs that had been fed a diet deficient in fat-soluble vitamin, mention the simultaneous development of skeletal deformities, pronounced in one case, in spite of the fact that the daily ration for each animal contained 5 gm. of precipitated calcium phosphate. This suggests the possibility that they may be observing a manifestation of osteomalacia similar to that seen by us, and modified simply by the age of the animals. Their cases were in puppies, whereas our cases were seen almost exclusively in mature dogs. As pointed out by Friedberger and Fröhner, rickets is merely an osteomalacia modified by the condition of growth in younger bones; osteomalacia is distinguished by a resoftening of the bones of mature animals, while in rickets the bones of young animals remain soft. As we have mentioned, the ophthalmia seen by Steenbock and his co-workers is occasionally seen in our animals, but we believe it to be independent of the condition causing bone changes except as a predisposing factor. It also occurs quite often in well-nourished dogs. We believe it to be an infective condition, and bacteriologic examinations apparently support this view.

In order to determine the possible etiologic relationship of bacteria to the lameness and destruction of bone tissue, we have routinely cultured the marrow of affected ribs and femurs, also the spinal fluid before and after death, and the heart blood. In two rib cultures a pure strain of *Streptococcus hemolyticus* was isolated, and in another case a similar organism was obtained from the marrow of the femur. However, the occurrence of organisms has been very inconstant, and those found have failed

to produce lesions when injected into dogs and other experimental animals.

DISCUSSION

It should be noted in connection with the occurrence of this so-called kennel lameness that the dogs are housed in clean, warm, well-lighted kennels, the sun on clear days penetrating to much of the interior at some time during the day. The cages in which individual dogs are kept are especially accessible to the sun's rays and are constructed so that they remain dry. It is possible that some of our cases of incipient lameness are muscular rheumatism purely, but such cases do not go on to an advanced stage without showing typical lesions of the disease we have described. It would seem, therefore, that rheumatism as such can be omitted from consideration except so far as it is a descriptive term applicable to certain clinical signs of the major disease. The differences between this kennel lameness and osteomalacia are: (1) The bones are more often pliable than brittle; (2) the skull bones do not bulge and the maxillæ are unchanged; (3) the long bones do not show changes grossly except occasionally by a slight thinning of the cortex; and (4) no inflammatory or ulcerative conditions of the joints or articular surfaces of the bones are apparent. Further, it would seem that the incidence of the disease is rather low for true osteomalacia, which should not be limited by the factor of an apparent individual susceptibility. When animals are all subject to the same conditions, such as those under our observation, they may not show signs of the disease from one to more than three years. It has been observed that except in the very early stages fairly large quantities of meat must be fed for a considerable time in order to effect a cure. It is apparent, then, that whatever of value may be contained in meat is present in small quantities and the feeding of it alone would not constitute a practical solution of the treatment. However, it is of value in all cases, and we wish to emphasize the proposition that the dog is primarily a carnivorous animal and that meat, judiciously fed, is not harmful and is an essential part of his diet.

SUMMARY

1. A disease is described which occurs spontaneously in dogs and clinically and pathologically more closely resembles osteomalacia than any other known condition.

2. The disturbance apparently is nutritional in character.

3. Further studies are in progress for the purpose of determining the exact nature of the disease, its cause, and its treatment.

4. The term "osteomalacia" is used in its general sense and not in accordance with the textbook conception. Since the latter includes several characteristics which have not been observed in any of the large number of cases that we have studied, it has seemed unwise to designate these cases as a disease of which they are, at best, atypical examples.

The disease we describe compares in many respects with conditions that are being extensively reported in connection with studies in vitamin deficiency. However, practically none of these studies has been made on mature dogs, so that comparisons with such findings are not warranted at this time.

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DR. RANSOM HONORED

Dr. B. H. Ransom, Chief of the Zoological Division, Bureau of Animal Industry, has been elected a Foreign Corresponding Member of the Reale Accademia di Agricoltura di Torino (Royal Academy of Agriculture of Turin, Italy, founded in 1785 by King Victor Amadeus III of Savoy).

THE ETIOLOGY OF POLYARTHRITIS IN SWINE¹

By ARCHIBALD R. WARD

Goshen, New York

GENERAL CHARACTER OF LESIONS

THE AFFECTED JOINTS are more or less enlarged. The stifle, hock, carpal and elbow joints are most commonly involved. On dissecting, the increase in size is found to be caused by excess of fibrous connective tissue and by irregularly shaped bony excrescences, the result of exostosis. In severe cases the exostosis leads to ankylosis.

The synovial fluid in the chronic cases with ankylosis is normal in color and amount. In the acute stage of inflammation the synovial capsule is distended with a serous fluid containing flakes or masses of fibrinous material. Occasionally the exudate is colored red by the presence of a few blood cells. Of the other blood cells present, lymphocytes are most common and are accompanied by a very limited number of polymorphonuclear leucocytes.

The articular cartilages exhibit erosions which may even excavate the bone. The synovial membrane is as a rule highly reddened and contains an excessive number of synovial villi.

PREVIOUS WORK ON ARTHRITIS IN SWINE

Glässer (1) describes a fibrinous inflammation of the serous membranes and joints of pigs. The animals are most susceptible during the first three months of life. Shipment and attendant harmful influences are regarded as predisposing factors of great importance. In the affected joints the synovial membrane is hyperemic and an increased amount of yellowish clouded synovia is present. Fibrinous masses are frequently observed in the joints, either lying loose on the synovial membrane or in suspension in the synovia. The organism regarded as the cause of the affection appeared to be a thin Gram-negative rod. Many rods appear somewhat bent, and a beaded appearance due to irregular staining is common.

¹ The observations herein described were made in the Pathological Division of the Bureau of Animal Industry, Washington, D. C. The present paper represents an effort to condense into moderate size a report on the subject containing original observations of autopsy material and animal inoculation experiments which are entirely omitted here.

Stützle (2) described similar joint lesions which he attributes to injury occurring during shipment. Attempts to recognize or isolate bacteria were uniformly negative.

Olt (3) has observed *Bacterium pyogenes* associated with polyarthritis in the hog, characterized by the presence of coagulated grayish red particles in the synovia, erosions of articular cartilages, excavation of bone beneath erosions, proliferation of the connective tissue of the joint capsule, numerous highly reddened synovial villi, exostosis with ankylosis and periarticular abscesses.

Holth (4) has observed *B. pyogenes* to be present either alone or in company with other organisms in the inflammatory exudate of suppurative joint inflammations of swine.

While the work being reported upon at present was in progress there has come to notice an article on chronic arthritis in swine by Sekiguchi and Irons (5). These writers report upon a number of cases in which short rods were present. They observe that the organism found by them differs from *B. pyogenes* in its failure to liquefy coagulated serum and gelatin. According to the description the organism in question differs but slightly from the one isolated by the present writer from a series of cases of arthritis herein reported, and is doubtless the same.

The present writer has observed a case of arthritis in a hog due to *B. pyogenes* and has carried out inoculation experiments with this organism in swine and rabbits. This case differs in etiology from a large number of pathological joints examined later, and also in that periarticular abscesses were present. However, it has in common with them the proliferation of bone, of synovial villi and of connective tissue, the erosions of cartilage and the reddening of the synovia and of the synovial villi so often encountered in the series of joints examined subsequently. The observations have been partially reported elsewhere (6,7). The organism in question is a comparatively rare cause of arthritis in swine and further reference here will be limited to the conclusions of the present paper.

CULTURAL METHODS EMPLOYED

In the work herein described the possibility of encountering *Bacterium pyogenes* in infected joints was in mind and necessi-

tated the employment of media which would satisfy the cultural requirements of that organism.

The cultivation of *B. pyogenes* required the presence of raw serum in the medium employed. Cattle serum was rendered sterile by filtration through a Berkefeld filter and was distributed with aseptic precautions in small test tubes, each containing about 5 c.c. of serum. When attempting to isolate the organism in pure culture, a tube of this serum was added to the cooled agar immediately before pouring the plates. Thus the serum constituted from 25 to 30 per cent of the volume of the plating medium.

Serum bouillon was prepared by pouring serum into tubes of common bouillon in an amount to constitute approximately 10 per cent of the volume of the mixture. The tubes of serum bouillon were tested for contamination by incubation.

Serum-agar slants for the cultivation of *B. pyogenes* were prepared by adding about 10 per cent of fluid serum to melted agar which had been cooled almost to the solidifying point.

ARTHRITIS ASSOCIATED WITH BACTERIUM ERYSIPELATIS-SUIS

A series of twenty-two sets of pig legs exhibiting various stages of arthritis were examined, with strikingly uniform bacteriological results. The first fourteen cases were sent to the writer by officials of the Bureau of Animal Industry meat-inspection service, in response to a request for specimens of polyarthritis without specifying the stage of development of the lesions. In consequence, a considerable number of joints contained advanced lesions with prominent bony enlargement. Subsequent experience has shown such joints frequently to be sterile. Material from pigs numbered 15 to 22 was selected in response to a request for joints exhibiting the early stage of distention of the synovial capsule by fluid. Examination of these joints resulted in the isolation of the same organism from at least one joint of 16 of the 22 sets of legs under consideration.

CULTURAL CHARACTERISTICS OF BACTERIUM ERYSIPELATIS-SUIS

The cultures isolated from joints of pigs 3, 5, 6, 8 and 10 to 22 were compared and found to be identical in morphological characteristics and in growth upon various media. The observations made are described below.

Morphology.—The organism is a nonmotile rod varying in length from 1 to 5 microns and is slightly less than 1 micron broad. It is stained uniformly by carbol fuchsin and by Löffler's alkaline methylene blue. When stained by the Gram method the color is retained. The organism does not possess the acid-fast characteristic. In a 24-hour bouillon culture some of the longer rods are observed to be slightly curved. The shorter rods show a tendency to cling together in pairs or more rarely in chains.

Bouillon.—Within 24 hours after seeding, the medium becomes slightly uniformly clouded with the collection of a whitish deposit upon the bottom of the tube.

Serum bouillon.—Within 24 hours the medium becomes slightly uniformly clouded, and a flocculent deposit collects upon the sides and bottom of the tube. At 48 hours the medium is still clouded. After four days the sediment increases in amount and forms a compact whitish mass. Upon rotating the tube on its long axis the sediment rises and forms a cloudy suspension consisting of dark particles of variable size.

Agar slant.—Growth is visible after 24 hours, but becomes more distinct on succeeding days. The path followed by the loop during seeding the medium is marked by the presence of numerous small separate grayish colored colonies. These are closely aggregated, become confluent to some extent, but the growth remains restricted. Under low magnification the colonies are seen to glisten, are slightly elevated and possess smooth, circular outlines. The water of condensation is slightly clouded and contains an abundant sediment which upon shaking causes a clouding with irregular shaped flakes.

Serum-agar plates.—After 24 hours of growth colonies are barely visible with the unaided eye. Under low magnification under the microscope they appear as small granular areas, brownish in color. After 48 hours colonies are plainly visible to the unaided eye as gray colored spots about 0.5 mm. in diameter. With the aid of a hand lens they appear as gray colored irregular shaped colonies. Under a 16 mm. objective they appear irregular in outline and in general have a granular appearance. The edges are rough and appear as if minute spines are projecting. Surface colonies are not detected.

Agar plates.—Growth on plain agar is not so rapid as on serum-agar. About three days are required for the colonies to become as distinct as two-day growth on serum-agar. Under a 16 mm. objective they are seen to be for the most part lenticular in shape and appear amorphous or finely granular in structure. The borders of the colonies are smooth and no protruding outgrowths are observed.

Six per cent glycerin-agar.—In slant cultures after 24 hours a delicate growth becomes visible on the surface of the medium, consisting of nonconfluent colonies. After 48 hours the growth increases slightly, but after longer periods no change is noted.

Serum-agar slants.—In slant cultures after 24 hours, growth becomes visible in the form of small, closely aggregated colonies. The condensation fluid becomes clouded with abundant sediment.

Gelatin.—In stab cultures after 24 hours at room temperature, a very faint line of growth marks the path of the needle. After three days, growth becomes much more distinct, but no growth is observed on the surface. After seven days the growth along the stab spreads into a broad column of liquefied gelatin¹ with fine material in suspension. There is a small amount of grayish white sediment in the bottom of the liquefied medium. The surface of the gelatin is indented by liquefaction.

¹ Liquefaction is said not to occur when the reaction of the medium is not exactly suitable, in which case the growth resembles a test tube brush.

In plate cultures after 24 hours a very few colonies are barely visible with the aid of a hand lens. With low magnification under the microscope they appear granular in structure and yellowish brown in color. After 48 hours considerable increase in the number of colonies occurs. With low magnification under the microscope they appear granular in structure and yellowish brown in color. After 48 hours considerable increase in the number of colonies occurs. With low magnification under the microscope the colonies appear straw colored, and circular in outline. The structure appears finely granular with delicate thread-like projections radiating from the colonies.

After growth for seven days the surface of the plate when scrutinized in reflected light shows shallow areas of liquefaction surrounding the colonies. Under a 16 mm. lens the colonies are straw colored, and display fine, colorless, thread-like projections radiating in all directions.

Fermentation of sugars.—One per cent of glucose, lactose and saccharose in fermentation tubes showed no evidence of growth after seeding and proper incubation. The three fermentation tubes after seeding with *B. coli* showed characteristic gas production.

Solidified cattle serum.—Growth in slanted medium consists of minute isolated colonies. No liquefaction is observed.

Milk.—No change is produced in this medium, nor in litmus milk.

Potato.—No growth is observed.

Indol.—No indol production is detected in Dunham's peptone solution.

ANIMAL INOCULATION

A pig inoculated intravenously first with a suspension of joint exudate and later injected twice with the organism in question developed a case of arthritis with extensive bone and connective tissue proliferation similar to the natural disease. The lesion was found to be sterile at the time of autopsy. Another pig inoculated intravenously with a pure culture of the organism on two occasions developed arthritis with distention of the synovial capsule, a condition typical of early stages of the natural disease. A pure culture of the organism was isolated from the lesion. Intravenous inoculation of grown hogs yielded negative results. It seems likely that older animals become more resistant to the infection than pigs one or two months old. Results of inoculation in rabbits are given in conclusions Nos. 8 and 9.

SIGNIFICANCE OF ARTHRITIS CAUSED BY BACTERIUM ERYSIPELATIS-SUIS

The first positive identification of swine erysipelas in the United States was made recently by Creech, who identified *Bacterium erysipelas-suis* isolated from cases of a chronic form of the disease. This chronic type of swine erysipelas is known as urticaria or "diamond skin disease" because of the diamond-

shaped lesions on the skin. This lesion has long been well known to Government inspectors in the various slaughtering establishments.

Hoare (9) describing the disease as observed in England, observes that arthritis occurs in the mild form of the disease. Hutyra and Marek and also Friedberger and Fröhner mention deforming arthritis as resulting from swine erysipelas.

The lesions studied by the present writer are typical of those observed with great frequency in the principal hog-slaughtering centers of the United States.

The facts warrant the suspicion that the acute, highly fatal type of swine erysipelas may exist in this country, so far unrecognized.

SUMMARY AND CONCLUSIONS

1. *Bacterium pyogenes* has been isolated from one case of multiple arthritis in the pig. The pathological condition of the case in question differed from others in the series studied, in that periarticular abscesses were present.

2. Pigs inoculated intravenously with *B. pyogenes* twice developed suppurative lesions in the bones. Those of the legs were usually located at the point of junction of the epiphysis with the shaft. The synovial cavities of adjoining joints exhibited suppurative conditions and were connected with the bone lesions by fistulae.

3. Introduction of cultures of *B. pyogenes* directly into the cavity of the femoro-tibial articulation of rabbits usually induces arthritis promptly.

4. In a large percentage of the joints examined there was found a small Gram-positive rod-shaped organism identified as *Bacterium erysipclatis-suis*, otherwise known as *Bacterium rhusiopathiae*.

5. Positive cultural results were obtained most frequently in cases exhibiting distention of the synovial capsule by serous fluid containing masses or flakes of exudate. Other conditions observed were lesions of the articular cartilages, the presence of numerous large synovial villi together with extensive proliferation of connective tissue and bone. The viscid exudate often was slightly colored by the presence of blood cells. Among other cells present, lymphocytes were most numerous. Polymorphonu-

clear leucocytes were present in only small numbers. Microscopic examination of synovial exudate revealed but few of the rod-shaped organisms, if any.

6. In joints exhibiting more advanced lesions such as excessive exostosis with ankylosis the synovial fluid was normal in appearance and generally sterile.

7. Arthritis has been produced in a pig by intravenous injection with *B. erysipelatis-suis*, and the same organism was isolated from the lesion at autopsy.

8. The femoro-tibial articulation of a rabbit was infected with the organism in question by direct introduction of culture into the joint cavity.

9. One intravenous inoculation of the rabbit with the organism induced infection of the stifle joint characterized by the presence of an excessive amount of grayish exudate. A pure culture was recovered.

10. It is believed that *B. erysipelatis-suis* bears an etiological relation to arthritis in the pig.

11. As all the observations herein recorded are based on material from abattoirs (leg only), no conclusions can be drawn regarding possible mortality associated with the form of swine erysipelas causing arthritis.

12. It is desirable that field observations be made with reference to the possibility of the occurrence of outbreaks of swine erysipelas associated with heavy mortality.

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THE PREPARATION OF TUBERCULINS ¹

By A. F. SCHALK

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THE ERADICATION and control of bovine tuberculosis fundamentally involves the use of biological preparations which are universally recognized and designated as tuberculins. While tuberculin was originally prepared by Robert Koch in the hope that its use would result in a beneficial therapeutic action against human tuberculosis, this use has been practically superseded by its use as a diagnostic agent. It is, then, for the purpose of diagnosis that this product finds practically its only use in veterinary medicine.

TYPES OF CULTURES USED IN THE PREPARATION OF TUBERCULIN

Tuberculin is the product of the metabolic activity of *Bacterium tuberculosis*. It is essential, therefore, in order to obtain the products of growth of the organism that pure cultures be used in its preparation. While three types, the human, bovine and avian, are quite clearly differentiated by their growth and culture characteristics and their more or less distinct specific pathogenicity for their particular hosts, this specificity does not appear to be followed with respect to the tuberculin reaction. The human type is not only suitable for use in the bovine diagnosis but is quite generally used for the preparation of tuberculin because of its more rapid and abundant growth on artificial media than are bovine strains. The Bureau of Animal Industry in the preparation of immense quantities of tuberculin has quite regularly employed human strains of the organism. Other laboratories employ bovine strains. Our own laboratory uses one culture from a bovine source, originally obtained from Holland about twelve years ago.

The laboratory of the North Dakota State Serum Institute employs a culture of avian origin for the preparation of tuberculin for use in testing fowls. The corelationship between the various types of tubercle bacilli is such that it is clearly evident that they are closely allied, so that reactions with tuberculin

¹ Presented before the twenty-fifth annual meeting of the Minnesota State Veterinary Medical Association.

prepared with one strain may be expected where infection exists with the heterologous type as well as with the homologous. The avian type is more differentiated than the other forms, so that it appears that a greater number of positive reactions may be obtained in fowls when tuberculin prepared with the avian strain is used.

The virulence of a culture is apparently not a prerequisite for its suitability for use in the preparation of a satisfactory tuberculin. Some authorities prefer to use virulent cultures. It appears that cultures maintained for a considerable period of time on laboratory media become less virulent for experimental animals. A more certain criterion of the usefulness of a culture is its ability to produce a tuberculin which gives a strong positive reaction in routine testing of infected animals. Obviously a minimum of nonspecific reactions should be expected.

The primary isolation of the organism presents some difficulties. Briefly, however, it consists in the inoculation of guinea-pigs with infected material and, after infection has developed, the transfer of small particles of infected tissue to suitable media, of which a number of forms are now in use. Successive cultures usually develop quite readily so that a perceptible amount of growth may be observed on suitable media within ten days following inoculation.

Cultures of both the bovine and human strains have many characteristics in common and for the purposes of this discussion the points of differentiation are hardly of interest. Both strains grow on the surface of the broth which is universally used for the preparation of tuberculin. The film is at first delicate and veil-like, later forming a pellicle of a dull white color. If growth is not interrupted the pellicle becomes quite thick and if disturbed masses fall to the bottom. A peculiar odor quite aromatic and quite characteristic is observed of such cultures. The broth cultures of the avian strain are inclined to be more slimy. While a surface pellicle is formed, growth is by no means confined to the surface as is noted with the human and bovine strains.

PREPARATION OF CRUDE TUBERCULIN

The composition of the media employed for the cultivation of the tubercle bacillus used in the preparation of tuberculin

varies somewhat in various laboratories. Because of the similarity in composition of media so employed, it is sufficient to mention that that which we use in our laboratory contains in each liter 1 per cent of sodium phosphate ($\text{Na}_2 \text{HPO}_4$), 3 grains of beef extract and 5 per cent of glycerol. The reaction is adjusted to faintly alkaline phenolphthalein. The broth is measured into flasks, which are plugged with cotton, sterilized, and then incubated for several days to show the presence of contaminating organisms. Such medium has for a period of several years given satisfactory results in the preparation of tuberculin which apparently gives strong positive reactions.

The Bureau employs a meat infusion broth, but inasmuch as such animals are largely byproducts of various investigational work, the cost of broth preparation is not materially increased.

Inasmuch as tuberculosis is strictly aerobic, the potency of a tuberculin is directly proportional to the surface area of a given volume of culture medium. Erlenmeyer flasks of 300 c.c. capacity and containing 100 c.c. each of broth fulfill the aforementioned factor.

Flasks are seeded by transferring a small amount of growth from a young and actively growing culture to each flask of broth. Care is exercised to float the mass of bacteria and thus permit the more ready growth of the new culture. The flasks are then incubated for a period of about three months. Growth in the meantime should have developed abundantly, with the entire surface of the broth covered with a dense, heavy, crumpled, dry appearing pellicle which crumbles when disturbed. The broth beneath the surface growth should remain clear except for precipitated masses of the tubercle bacillus. Cloudiness or turbidity of the medium indicates contamination, and such flasks should be rigorously excluded in the final preparation of tuberculin.

The preparation of crude tuberculin remains today substantially the same method as outlined by Koch in 1890. Certain slight modifications have been introduced in some laboratories. This product prepared from the ripe culture broth is designated as crude tuberculin "brute," "Koch's old tuberculin," "old tuberculin," "concentrated tuberculin," or as "O. T." This product is the basis of the various tuberculin preparations used in veterinary practice. The ripe flasks of tuberculosis cultures

are sterilized in the Arnold sterilizer for three hours so that organisms are destroyed and are no longer capable of producing an infection. The clean uncontaminated flasks of sterilized culture are then filtered, and the resulting clear amber solution is evaporated on the steam bath to one-tenth of the original volume of the culture medium before incubation. This heavy brown liquid, containing a high percentage of glycerin, is filtered clear, and constitutes the crude tuberculin for further use. The degree of concentration varies among different laboratories, some concentrating only sufficiently to allow for the addition of the preservative. The dosage should be determined as quantity of "old tuberculin," however, for the purpose of uniformity.

KINDS OF TUBERCULIN USED

Present methods of tuberculosis diagnosis involve the use of but three forms of tuberculin. These are prepared from, or the dosage is based fundamentally on, previously prepared crude tuberculin.

Subcutaneous tuberculin is prepared by diluting crude tuberculin with 0.5 per cent phenol so that the desired amount of the crude tuberculin is contained in the usual dosage. The Bureau tuberculin contains 0.5 gram of crude tuberculin in each 4 c.c. That prepared by the North Dakota State Serum Institute contains 0.6 gram in each 4 c.c. of the final dilution. The clear, diluted subcutaneous tuberculin is distributed in vials or ampules, sterilized, sealed, and is then ready for distribution.

Tuberculin for the intradermal test is prepared from "old tuberculin" by dilution with at least an equal volume of distilled water. A slightly greater percentage of water (80-120) does not decrease the efficiency of the product and yet renders it less viscid, so that it will flow more readily through the smaller caliber needles. Phenol, which is more or less irritating to the tissues, is not added in either intradermal or ophthalmic tuberculins. It is possible that when purified precipitated tuberculin can be manufactured on a more economic scale this product will be redissolved and used for intradermal purposes.

Ophthalmic tuberculin is prepared from partially concentrated tuberculin by precipitation methods. Most laboratories use absolute alcohol for this purpose. The active principles which induce the reaction are carried down with the precipitate

and are incorporated in tablets by the aid of lactose or milk sugar. The precipitation serves to exclude the glycerin, thus making a purer end-product and likewise removing probable sources of error in the interpretation of results. The absolute alcohol method of precipitation involves a very expensive process, and it is highly desirable to devise other means by which a potent, purified product can be produced on a more economic basis.

STANDARDIZATION

The true indication of the potency of tuberculin is its ability to induce vigorous, positive reactions in routine testing under field conditions. Attempts have been made to standardize the product by means of laboratory methods, but so far with little success. Methods have been used wherein tuberculous guinea-pigs were injected with varying doses of tuberculin. The potency is then ascertained by the amount necessary to kill infected animals. Obviously this method is crude, costly, and difficult of application and is probably but little used. The fact remains that we must still rely very largely for the determination of potency on care and skill in preparation, with the careful observation of certain factors in that process, and the fact that it is efficient when used in the field.

THE TUBERCULIN REACTION

The biological mechanism of the various tuberculin reactions can best be explained on the basis of the anaphylactic phenomenon. While this is generally assumed, some authorities oppose this view. However, there is certainly a generalized hypersusceptibility in tuberculous animals which is at least analogous to the phenomenon of anaphylaxis. The tubercle bacilli are considered as stimulating the body cells to produce an antibody or a ferment in the nature of an immune body or amboceptor which splits the tubercle protein, which is of a low degree of organization—probably a polypeptid—liberating a protein poison whereby the various reactions are induced. The general reaction may be explained as due to a general effect of the poison on the body cells. The local reaction is caused by a concentration of the toxic end-products at the site of administration of the tuberculin. The appearance, then, of the local and systemic

reactions, which we recognize as positive tuberculin reactions in infected animals, from contact with specific antigenic substances which at least in similar quantities produce no effects in healthy animals, is at least a parallelism if not itself a true manifestation of the anaphylactic phenomenon.

Dr. M. J. Harkins, of Conshohocken, Pa., is now engaged in work with Dr. J. A. Kolmar in connection with the Dermatological Research Laboratories of Philadelphia.

Dr. R. W. Peehin was elected Burgess of Phoenixville, Pa., last November. He is the youngest Mayor in the United States.

Dr. George Hilton attended the ninth annual convention of the Western Canada Live Stock Union, held at Regina, December 14 and 15, and delivered an address on "The results obtained under the accredited herd plan, and the proper method of housing live stock, with a view to preventing the spread of infection."

A meeting of the field officers of the Health of Animals Branch, working in the Province of Ontario, was held in the Toronto office on December 30, to discuss matters relating to the eradication of tuberculosis, at which Veterinary Director General Torrance presided.

Dr. J. B. Still, of Winnipeg, addressed the members of the Manitoba Cattle Breeders' Association at their annual meeting in Brandon, on January 6, on the accredited herd plan.

Dr. Seymour Hadwen and W. F. Baneroft, of the Bureau of Biological Survey, accompanied by Dr. B. H. Ransom, of the Bureau of Animal Industry, spent March 13-15 at the Government Quarantine Station, Athenia, N. J., examining 60 head of reindeer imported from Norway for the State Conservation Commission of Michigan. The deer were held in quarantine from March 10 to 25, and will be turned loose in northern Michigan for propagation and restocking purposes. These deer are being introduced by State authorities. The Federal work with reindeer is being carried on in Alaska.

HYGIENE AND SANITATION IN CARE OF YOUNG ANIMALS ¹

By E. S. DEUBLER

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THE SUBJECT of hygiene and sanitation is such a large one that I could not hope to cover it thoroughly, and therefore will speak only of some personal experience in the care and management of farm animals, chiefly dairy cattle and swine.

There is no doubt that while the animal is young hygiene and sanitation are of the greatest importance, and that the mortality in all animals is greatest during the first month of life. We should even go back to the time before the animal is born and consider the pregnant mother, if we hope to have a good, strong, vigorous offspring at birth. Among the influences of the dam affecting the fetus we can mention food, exercise, stabling, milk production, disease, etc.

As we become experienced in handling pregnant animals and young ones we are sure to develop some theories which are hard to prove or disprove, because experiments are hard to control. Therefore I am not sure whether it is safe or unsafe to mention them.

The feed of the pregnant dam is important, specially so in handling dairy cows, where the milk-producing function has been highly developed. These cows have such a strong tendency to convert food into milk that they are hard to dry off, and therefore do not fully nourish the fetus, which is apt to be born emaciated and weak. By widening the ration and feeding only a small quantity of digestible protein, as corn, oats and hay, in liberal quantities, the cow will usually dry off. I am very partial to corn meal or hominy as a desirable feed for pregnant cows, and believe that we will usually find most good dairymen feeding too narrow a ration because they are trying to stimulate milk production. It is much easier to make large production records if we disregard the future usefulness of the cow or her breeding functions, and we should be on our guard when ambitious herdsmen are trying to make big records.

¹ Presented at the Conference of Veterinarians held at the School of Veterinary Medicine, University of Pennsylvania, February 28 and March 1, 1922.

On the other hand it is more common to overfeed pregnant sows with corn, ear corn being such a convenient and universal feed for hogs. Breed sows are often fed almost wholly on this grain, with little protein, and consequently get too fat and produce weak pigs. An addition of alfalfa hay, tankage, linseed meal or wheat bran will prove of great value in such cases.

Much has been said recently of the value of mineral preparations in the prevention and cure of almost all breeding problems. No doubt there is a field for such preparations, because many rations are deficient in mineral matter, but when one reads in an advertisement, "Cows supplied with special cattle minerals insure strong, healthy calves and all losses from white scours and such conditions are eliminated," we must conclude that the claims are overdrawn.

Exercise of the pregnant mother is important. Cows receiving plenty of exercise as a rule drop stronger, more vigorous calves. A breeding herd should be turned out every day, if only for half an hour. Some veterinarians claim to have reduced the percentage of retained placenta in herds by abundant exercise of the cows. It is important to exercise the pregnant brood sow, and this may be accomplished by feed in the opposite end of the lot from the sleeping quarters, forcing the sow to walk for her feed.

A dry, well-lighted, well-ventilated stable is without question conducive to the health of any animal, and especially is this true in the case of pregnant or new-born animals. In large herds the ideal method is to place the pregnant animal in a dry, clean box-stall a few days before parturition, and feed light, laxative feeds.

At the time of parturition it is well to be present and render such assistance as may be necessary. The usual mistake, however, is to try to aid or interfere too soon and thereby excite the mother.

With cows we make it a practice to leave the calf with the dam for three or four days, except in a case of milk fever, or where the mother would injure her young or for some similar reason. The colostrum is nature's food for the new-born, but in handling a Bang herd at the State farm we raised many calves that were never allowed to nurse their dams, and found eastor

oil would take the place of colostrum where a laxative was required.

When it is necessary to feed a new-born calf by hand, give it the mother's milk if possible, or the milk of a cow fresh for a short time, and be extremely careful not to overfeed. One pint of milk three times a day is enough for the first two days, and then increase very slowly, always reducing the milk promptly on the first signs of indigestion. Two quarts of milk three times daily is enough for a strong calf, two to three weeks old, if the calf is to be raised. Veal calves may have more. The calf should have hay when one week old. The more roughage it eats the less liable it is to indigestion.

The most critical period of animal life is the first few days after birth, and with cattle white scours is the most common disease and the one that causes the greatest losses. The larger and better bred the herd the greater the trouble with white scours, and many men have found it impossible to raise a single calf for long intervals. I have seen many calves born as strong, large and vigorous as one could wish, and in forty-eight hours be dead with white scours. Some of the calves are very valuable and the owners willing to go to any expense to save them, but they are usually beyond help when the veterinarian arrives. Calf-scur serum was used with some success, but it was necessary to inject the calf within an hour after birth. I found the best results with serum by injecting intravenously as soon after birth as possible. Later, I found a 100 per cent perfect method of preventing white scours by hygiene, and if you will bear with me I would like to tell you how this method developed. It disproved some old theories about white scours and is so easy that you would probably not carry out the details completely unless the whole story were told.

When calf scours was at its worst in a large herd of 100 pure-bred dairy cows, of which I have had charge for the past ten years, we found that some of the calves born out in the field would live, if we did not put them in the calf barn too quickly after birth. Again, when by chance some cows calved in a horse barn which was used for calving on account of other box stalls being occupied, the calves lived. Therefore in summer we let as many cows calve in the field as possible, and kept calves out until past the scour period, or about two weeks. In winter we

took cows to the horse barn to calve, but found that when three or four cows had calved in any one box stall, the next calves born in that stall would probably develop scours. Having four or five small barns on the farm, we used all for calving, with like results. We built a new calf barn, light, warm, dry, well ventilated, consisting of two rooms separated by a feed room. In one room were six box stalls with pipe partitions for calving cows and twelve individual calf stalls. The calves did well in this barn for a short time, then all new-born died of scours. We disinfected each stall after every calving, removed all bedding, scrubbed floor, side walls and partitions thoroughly with strong disinfectant, but the trouble persisted. We washed the cow before calving, tried to catch the calf on a clean blanket, tied the navel quickly, painted cord with iodine, etc., but still nearly all died. Occasionally we removed everything from this room, scrubbed thoroughly, sealed doors and windows and fumigated with formaldehyde. Always after such a fumigation the first few calves born would live. We then disinfected as often as possible, but this being the maternity building, we could not vacate it entirely for fumigation as often as we liked. We built a maternity stable and arranged it so that each stall was independent, having an outside door and no direct communication with other stalls. The doors and windows were designed to be tightly closed, for fumigation. The cows were put in one of these clean stalls a few days before calving, where they calved, and were left with the calf for a week or ten days, or if the cow was removed the calf was left there until ten days to two weeks old, when it was removed to the calf barn. The cows are always fairly clean, but were not washed or disinfected before being placed in the maternity ward or stable. The calf had no special attention: navel was not tied or disinfected. When cow and calf were removed, everything was removed from the stall and it was disinfected and fumigated. Fresh bedding was put in and the stall was ready for another cow.

This plan has been in operation at Penshurst since 1912, with complete success in controlling calf scours and calf pneumonia, and it has assisted greatly in getting rid of abortion. You might think that the infection has been killed out on the farm, and there was no further danger. I think there is always

danger of scours in a large herd. We have sometimes left a stall without disinfection and found the calves born in this stall became infected, or we have been obliged to put the young calves in the calf barn before they were one week old, and some of them have shown symptoms of infection. The same plan has been used on other farms, where the losses from white scours were heavy, and with complete success.

Calves older than ten days are subject to other infections, scours, pneumonia, etc., which may go through the entire lot. I have found nothing better to check these epizootics than to remove the healthy animals to a clean stable and disinfect the infected stable. The stable itself is a big factor in the cause of all these epizootics, a damp, poorly ventilated stable being an ideal incubator.

A few days ago a friend asked me to look at his calves, two of which are now in this hospital. The barn was a new one, well arranged and well built, except the calf stable, which is a one-story wing with wooden walls and roof without air space. There were several large windows but no ventilating system. There was a concrete floor. The weather had been cold and snow covered the roof. The walls were soaking wet and drops of water standing over them. It is believed that these conditions had much to do with the cause of the trouble. A stable need not be elaborate or costly, but it must be dry. Many expensive stables are unhealthful. If a young animal is dry it will stand severe cold.

Many of the diseases of young pigs are caused by wet or damp quarters. As the animal grows older we always find that it thrives best under good hygiene and sanitation and by the exercise of plain common-sense methods. By these means we may avoid disease and setbacks in growth.

Possibly we may consider all animals young animals until they produce young.

I would like to touch on one phase of that dreaded disease, abortion, which I believe can be controlled by hygiene. In many herds the greatest losses from abortion occur among the bred heifers. It is quite a common occurrence to find more abortions of the first calf than any other. A few years ago we were told that this was because the calves were fed milk containing the Bang organism, which they harbored in their bodies, until

they became pregnant, when the organism became active in the uterus and caused abortion. We were advised to feed all heifer calves pasteurized milk to avoid these results. I never believed this theory, and took some heifer calves and fed them until they were weaned wholly on the milk of cows which had aborted. These heifers all calved normally. I believe that if a heifer is kept away from infected cows and their products and infected stables, from six months before she is bred until the time she is due to calve, there is no danger of her aborting her first calf. These heifers should be kept in pastures and stables not used by cows, and they *must not* come in contact with infected cows or infected food. One experiment which I made about five years ago gave very clear evidence on this point.

A group of twenty heifers was raised under identical conditions until two months before breeding. Ten were placed in barns with the cow herd, and the other ten in a barn that was never used for anything but young stock, and with no connection with the breeding herd. They were all bred, and 70 per cent of these heifers in the cow barn aborted their first calf, while 100 per cent of the heifers bred in the heifer barn calved normally. Following this experiment all the heifers on this farm are bred in the heifer barn, and with an average of 15 to 20 heifers calving yearly none have aborted their first calf.

All present have probably read Bulletin 363 of the Pennsylvania Department of Agriculture, on "Infectious Abortion," issued in December, 1921. This bulletin gives twenty-six excellent recommendations for the prevention of abortion, and twenty-four of the twenty-six apply to hygiene and sanitation.

I am sure we all realize the importance of hygiene and sanitation in animal husbandry, and hope the time will soon come when owners of herds will recognize that it is better policy to employ veterinarians to keep their herds healthy than to treat disease and correct troubles that might have been prevented.

At the suggestion of the Post Office Department the Bureau of Chemistry made tests of several so-called sex detectors, with the result that all the manufacturers have gone out of business. Tests on eggs and other things by a number of persons showed that all the instruments were useless.—*Southwest Plainsman*.

SOME THERAPEUTIC SUGGESTIONS

By E. T. BAKER, Moscow, Idaho

MANY VETERINARIANS neglect the value of certain distinguishing colors and odors in medicinal mixtures. By using the same color and odor the client becomes accustomed to them and is often enabled to ask for "the same medicine I got last year" long after the veterinarian has forgotten it. It is in the nature of the idea used by the large manufacturing firms, such as the Victrola Company, which has featured the dog listening to his master's voice. Neighbors in talking with one another often remark that "that red medicine I got from Doc sure did the work," and straightway others want it. The practitioner who leaves a four-ounce bottle of turpentine, let us say, or any other common medicine without any distinguishable odor and color, is not only doing himself and his profession harm, but it reacts on his client as well. The latter begins to use this for everything, from colic to milk fever, and soon loses confidence in everything and everybody, including the veterinarian and himself.

The older practitioners, who possessed plenty of business sense and some of them considerable hokum, amassed the coin just the same. In order to make the graduate capable of competing with the empiric he must have some business training, and it would seem to a man up a tree that our colleges often teach everything but how to make a living!

The various oils, such as turpentine, eucalyptus, cajuput, mineral, raw linseed, can be colored a beautiful red with alkanet root. Take a dozen pieces of the root (the leaves and dust are worthless) and tie in a small piece of gauze with a foot of string attached. Soak this in a pint of the oil twenty-four hours, and this will be sufficient to color several gallons. One can also procure various oil-soluble colors at very reasonable rates.

To deodorize oils, the synthetic oil of wintergreen (methyl salicylate) and the synthetic oil of bitter almonds (benzaldehyde) are two very good and penetrating ones. Other essential oils can also be used, but these are two old stand-bys.

Fruit colors, such as are used in bakeries, are nonpoisonous and very good for use in aqueous solutions. These come in pastes, tablets and liquids, the latter being the most convenient. Red, green and orange are three common ones.

The common white lotion, for example, can be colored a beautiful green, and with the addition of an ounce of benzaldehyde to the gallon one has a very distinguishable product, easily remembered by the client, and much more efficacious than the plain lotion.

The white liniment, when made up with 8 ounces each of *oleum terebinthæ* and *aqua ammonii*, 2 ounces each of oleic acid and oil of methyl salicylate, with water (colored red) enough to make 1 gallon, forms a beautiful pink to red solution. To get a more creamy lotion one can dissolve several ounces of ammonium chloride in warm water and mix; let stand twenty-four hours.

Formalin, used so extensively in tympanites, can also have red coloring matter and benzaldehyde added. One-half ounce of this can be put in pop bottles or pint bottles, filled up with water, and kept for emergencies. These can always be kept in one's medicine room, and when some town cow swells up during your absence on a call, the wife can dispense it and greatly alleviate the excitement.

A very useful mixture that can be used for colic or indigestion in horses, bloat in cattle or digestive ailments in pigs or sheep is the following: Twelve ounces each of sulphuric ether and chloroform, 4 ounces oil of eucalyptus and camphor (a saturated solution), with *oleum terebinthæ* (colored red) q. s. 1 gallon. One to four ounces of this can be given in water, oil or "straight" with a syringe or in an ounce capsule. Of course other drugs, such as aromatic spirits of ammonia, *nux vomica*, chloral hydrate, hyoseyamus, belladonna, stramonium, dioscorea, colocynth or pilocarpus can be added. But the above is an excellent vehicle and can be used as an all-round medicament. It is also useful in rubbing over the back of a cow down with milk fever, and will often induce her to take up her bed and walk, if she be of the stubborn type. If you are caught without any liniment in an azoturia case and the client demands something to "rub over the kidneys," give him a couple of ounces of this.

Another excellent combination for wire cuts, preventive for maggot infestation (particularly in sheep), is to pour 2 ounces of lysol or liquor compound cresolis into a pint bottle, add 20 grains of pyoktanin blue and shake well, 2 drams benzaldehyde, and fill the bottle with kerosene.

Solutions of potassium iodide can be of a green color but

odorless. Fowler's red, while the potassium bichromate supplies its color.

A very satisfactory application for collar galls is the mercuric ointment, 50 per cent. By adding charcoal and benzaldehyde, the efficacy is much improved.

The alum treatment in laminitis is enhanced by adding some charcoal, aloes and a few crystals of potassium permanganate.

For mammitis one can use equal parts linimentum saponis, fluid extract phytolacca and cottonseed oil, with a dram or so of methyl salicylate to the pint.

For an absorbent for general use in sore tendons, swellings, etc., the following is excellent, but rather expensive: Iodine crystals and potassium iodide, of each 4 ounces; triturate these in a separate mortar with a little alcohol or spirits camphor; gum camphor 8 ounces and menthol 2 ounces; triturate these in another mortar with a little alcohol; and ichthyol and methyl salicylate, of each 4 ounces, mixed up separately. Warm 5 pounds of yellow petrolatum, and mix the first mentioned in well, then the contents of the second mortar, then the third. An elegant preparation is the result, and its uses are many. In a severe sprain or bruise on oneself, the writer does not know of any better treatment than to add a half ounce each of belladonna and aconite to a pint of white lotion, bind on for twenty-four hours, keeping saturated the inner fold of cotton, and then applying this ointment several times daily.

Dozens and hundreds of other successful combinations, inexpensive and yet doing the work, could be given, but space forbids. With the rapid increase in price of most of our drugs and with a very slow return to normal, more headwork must be used. With alcohol for medicinal use almost impossible to procure, the fauceet has become a general favorite. With the field of practice being rapidly narrowed by salaried officials, county agents, patent medicines, and agricultural graduates with just enough veterinary science to make quacks of them, the practitioner faces a not very rosy future. Even our various associations are paying very little attention to the practicing veterinarian, so that the latter must use what little brains he possesses in order to survive. These therapeutic suggestions are given to help in the general cause. The writer also wishes to commend to the profession various laboratories maintained by veterinarians. These

firms are putting out specialties, biologics and drugs in better forms and even cheaper than we can make them up ourselves. Then again, they maintain a bacteriologic department, where we may come with our puzzling cases, and perhaps are the best aids the practitioners have at present.

A good many of our citizens will wonder at the superfluous energy of the Federal Government in preparing and issuing a pamphlet on "How to Keep Your Cellar Dry."—*Louisville Times*.

The fashion news from Paris is that the dresses over there are not full. Over here they are full and running over.—*Washington Post*.

More flies are caught with molasses than with vinegar, but there is something terribly conclusive in a swatter correctly applied.—*Journal of the American Medical Association*.

The British Government has installed at the Liverpool docks a small experiment station for the disinfection of wool and hair against anthrax bacilli.

A conference for the international standardization of serums has been held at London by the Health Committee of the League of Nations. Several subcommittees were appointed to study special problems and collect data. Another conference will probably be held during the present year at the Pasteur Institute of Paris.

An American motion picture showing the production of pure milk was recently shown in a Paris public school with the object of interesting the French public in improvement of the milk supply.

An Australian veterinarian reports a case of suffocation of a pony by a snake which crawled up the nostril and into the windpipe. The report does not state whether or not the country is under prohibition.

SWINE DISEASES AS WE FIND THEM IN THE FIELD ¹

By W. H. DREHER

Oregon, Wisconsin

I WONDER how many of us ever stopped to enumerate all the ailments that the hog is heir to. I shall not attempt to mention all of these diseases, but shall touch only on the most important ones that we meet with in practice. The object is not to bring out any startling discoveries as regards swine diseases, but rather to create a discussion which will be both interesting and beneficial to us all.

Investigators of swine diseases differ in so many ways that when we go into a herd of sick animals to make a diagnosis we are often very much at sea as to what the trouble really is. Therefore we must take our time and look well into the conditions that confront us, especially as to sanitation, housing and feeds, and make a careful postmortem examination if possible before making a statement to the owner as to what his herd is really suffering from. The time is not long past when about all we looked for in a herd of sick hogs was hog cholera; but not so today. We must be able to differentiate between hog cholera, necrotic enteritis, hemorrhagic septicemia, infectious rhinitis, broncho-pneumonia or swine influenza, and many others.

Ofttimes the trouble will be found to be due to improper care or feeding, or to improper conditions in the houses or sheds. Large quantities of fine dust that accumulates in hog houses during the summer often produce a mechanical pneumonia that gives no end of trouble.

I shall not dwell on hog cholera, for I feel that we all are familiar with that disease, and we have had more or less experience in its control.

INFECTIOUS NECROTIC ENTERITIS

Infectious necrotic enteritis is a specific infectious disease of swine. Many differences of opinion exist as to the etiologic factor, and as far as I have been able to learn no one particu-

¹ Presented at the annual meeting of the Wisconsin Veterinary Medical Association, Madison, Wis., January 19, 1922.

lar microorganism has yet been isolated from the bodies of pigs that have succumbed to this affliction. The *Bacillus necrophorus* has received credit of being the causative factor, but it does not seem plausible that one organism could produce so many lesions in different parts of the body. Dr. Dimock, of Kentucky, claims that of all the organisms which have been found associated with this disease the one against which there is the most incriminating evidence is the *Bacillus suispestifer*.

Symptoms.—This disease is characterized by a profuse and persistent diarrhea. The respirations are normal, with temperatures as a rule lower than in cholera, yet occasionally we find it as high as 106° F., though rarely. The appetite of affected pigs is very slightly, if at all impaired. Visible mucous membranes are normal or anemic. The skin of the neck, shoulders and back becomes scurfy and sometimes cracks. The affected animals remain active on their feet, but emaciation develops slowly and the animal seems to dry up. The progress of this disease through the herd is slow.

Treatment.—My experience in treating this trouble has been anything but gratifying. I have used bacterins and all of the medicines that were ever suggested, I suppose, but to no avail. When once a pig becomes affected there seems to be no help for him. Prophylaxis is very important, however. Give the herd an entire change of quarters. Put them in a fresh pasture away from all hog yards, if possible, and thoroughly clean and disinfect all hog houses and feeding floors, and do away with the old hog wallows by filling with fresh gravel.

Postmortem Findings.—A diffuse necrosis of the mucous membrane lining either the large or small intestine is the outstanding lesion. The membranes may be much thickened and tough, or, as is frequently the case, they resemble a false membrane which is dark colored and when removed disclose a very inflammatory condition beneath. Often the membranes lining the intestines have become so thickened as almost to occlude the lumen of the bowel.

RHINITIS

Rhinitis is an infectious disease affecting the upper air passages of the pig. This disease has given me considerable trouble in the past few years on certain farms, and each year the losses on these particular farms have become greater. It affects the

pigs when young and oftentimes gets a good start before it is noticed by the owners.

Symptoms.—This affection is characterized in the beginning by a catarrhal inflammation of the nasal mucous membrane, and at the time the animals snuffle or sneeze. Later the cartilages and the bones of the face become involved and bulge, presenting a peculiar appearance known as "bull nose." I have seen this particular bulging attain considerable size, even as large as an apple.

While it has never been determined what particular micro-organism is the primary cause of this condition, the one most frequently encountered and the most easily isolated, according to Dr. Dimock, is the *Bacillus pyocyaneus*. The mortality is low, yet the affected pigs grow and never amount to anything.

Treatment.—Hygienic measures give by far the best results. Again I have tried bacterins and different medicinal agents, with but very little if any success. Dipping in a strong solution of potassium permanganate in the early stages seems to benefit, but the most important thing to do is to remove the herd from the infected pens and place them in a grass pasture with clean sleeping quarters, troughs, etc., and plow up the old yards if possible. It has been suggested by some investigators to change the breeding stock.

"SWINE INFLUENZA" OR "BRONCHO-PNEUMONIA"

I think it was about three or four years ago that we were confronted with a condition in hogs that had us all guessing, and I am not so sure that we are not guessing still. Considerable difference of opinion exists at this time among investigators of swine diseases as to whether hemorrhagic septicemia and swine influenza are not one and the same disease. Dr. C. P. Fitch, for instance, says: "This disease does not exist among swine," while such men as Drs. Edwards and Murray of Ames, Iowa, and Dr. J. S. Koen of the Bureau of Animal Industry, all recognize this condition as influenza. Dr. Edwards says: "The bipolar organism plays little if any part." Dr. Murray of the same place substantiates this claim and has isolated with marked regularity a micrococcus from the bodies of pigs that have succumbed to this disease, has made cultures of them in the labora-

tory, and has produced by injections of these cultures the same conditions in susceptible pigs.

Symptoms.—A large number of the animals in a herd appear to be extremely sick within a very short time. Invariably the owner will tell you that the pigs have cholera and will want you to come in a hurry. The affected animals become gaunt and have a pronounced and peculiar dyspnea and thumpy breathing. The sick pigs lie around in pairs, or groups of four or five, and when driven up they have a heavy, painful cough and will move about a short distance before they lie down. There is a marked muscular soreness with oftentimes a paralysis of the hind quarters. When these pigs are lifted to their feet they squeal. More or less congestion of the eyes is present, with a watery discharge from the eyes and nose. The temperature runs very high in this condition, often up to 108°F. There is loss of appetite, with a very rapid and pronounced loss of flesh; in fact the flesh seems to melt from the body. This condition lasts, as a rule, about four or five days, and about the time you expect the animals to die they begin to recover.

While the progress of influenza through the herd is rapid, yet the mortality is low. In most herds not more than 1 per cent will die, yet in my experience I would place the losses at about 2 per cent.

Treatment.—Respiratory stimulants such as the guaiacol and camphor preparations have given me good results. Dry sleeping quarters that are free from dust are essential. Plenty of fresh, pure water and very little if any corn must be fed.

Postmortem Findings.—A bluish discoloration of the skin of the belly and a considerable amount of froth in the nostrils are characteristic. A marked congestion of the mucous membrane lining the air passages, with a considerable quantity of reddish, frothy liquid filling the bronchioles is usually found. We find a lobular pneumonia, which gives to the lungs a mottled appearance. The lymph glands, particularly the cervical, bronchial and mediastinal, are swollen and juicy, with few if any hemorrhages. The heart may or may not show the hemorrhagic areas. There is usually a slight inflammation of the mucous lining of the stomach. The bladder is distended and may show hemorrhagic areas, but petechiae are seldom found.

UMBILICAL HERNIA OPERATION IN THE MALE PIG ¹

By O. N. SCHULTZ, Latimer, Iowa

THIS is a surgical operation which might be regarded by some as being of a minor importance, and yet we are frequently called upon to do it, and in valuable animals a successful operation brings much satisfaction to the owner.

I have used two methods for reducing such hernias. The first method, which consists of opening the hernial sac and suturing the ring, has not been successful with me because of recurrence. I think the reason for recurrence is that the ring is so rigid that too much traction must be applied to bring the edges into apposition, in consequence of which the edges are liable to pull apart before they have united by granulation.

The other method has proven reliable in all cases that I have operated. The animal is prepared by putting it on a light diet for two days previous to the operation, for the purpose of reducing the abdominal weight. I always use some form of anesthesia. Although chloral hydrate is the agent I generally employ, I find the effect on the animal varies when considering the dose per body weight administered. Frequently to get the desired state of narcosis I employ with it ether and chloroform or ether alone. I have been using the formula containing chloral suggested by Dr. H. E. Bemis, namely, chloral 1 dram, acacia 1 dram, water 1 ounce. With chloral in this dilution I have administered 2 to 4 ounces per 50 pounds body weight per rectum.

We nearly always encounter difficulty in making the animal retain the solution when administered per rectum. I think the action of chloral would be more uniform if it were possible to get a complete retention of the drug. I always employ the maximum dosage suggested in the above formula and inject it high per rectum. I think with a little practice and care, enough of the drug with the dose suggested will be retained to get a satisfactory narcosis. The rectum must first be emptied, otherwise the drug may be expelled. To make the rectal injection I employ a 4-ounce dose syringe equipped with a 9-inch nozzle. The nozzle should be well lubricated to make the insertion easy. When

¹ Presented at the thirty-fourth annual meeting of the Iowa Veterinary Association, Des Moines, Iowa, January 17-19, 1922.

the nozzle has been inserted as far as it will go, a small amount is injected, followed by an attempt to get the nozzle farther on, and this is continued until the proper dose has been administered. After the nozzle has been withdrawn it is usually best to put pressure on the anus for a little while to prevent the animal from expelling the solution. However, if the animal struggles very much it had better be turned loose, as it is more liable to expel the solution through its struggling than when let alone on its feet.

I have found that in twenty minutes the action from the chloral has reached its height. If the narcosis is not satisfactory at that time I administer by inhalation ether and chloroform, or ether alone, depending upon the action from the chloral.

The seat of operation should be well prepared, as this operation should be performed as aseptically as possible to avoid stitch pus and recurrence as a result. After preparing the part to be operated on, I fit a clean cloth provided with a slit over the ventral abdomen and allow the hernial sac to protrude through the slit. This will prevent at least some contamination from the surrounding parts.

TECHNIQUE OF OPERATION

An elliptical incision is made over the fundus of the hernial mass. The isolated island of skin is removed down to the hernial sac. By means of blunt dissection the hernial sac is isolated from the surrounding tissue. This dissection is to be carried on until the neck of the hernial sac is reached, at which point the wall of the sac will be found to be thinner than at the fundus of the sac. The hernial ring is usually elliptical in shape, so to ligate the neck of the hernial sac at this point I have used a hernial clamp and brought the sides of the neck together with a tug stitch. For this purpose I have used a sterilized No. 16 braided silk. After the clamp is removed the hernial sac is cut off about a half inch below the line of suture. The stump is then thoroughly painted with tincture of iodine, especially along the line of suture. There is some tissue in this region, the cutaneous abdominal muscle, which is brought together over the stump and the edges united, using an interrupted stitch set closely in order to get good close apposition. I generally employ a No. 3 catgut

for suturing this layer, so as not to get any irritation from the stitches later.

The purpose of this line of suture is to support the stump of the ligated neck of the hernial sac long enough for it to form a firm plug in the hernial ring, which is what we are working for as we are depending on this plug to retain the intestines and thereby prevent a recurrence of the hernia. An improvement has been suggested by Dr. H. E. Bemis, as follows: Isolate and ligate the hernial sac as before, being sure to obliterate the sac completely, split the fascial sheath which surrounds the *rectus abdominus* muscle, and pull the edges from either side over the median line where they are sutured. This makes a more rigid support to the stump than does the cutaneous muscle, and I feel that this method is to be preferred in cases where it is possible. Lastly, the edges of the skin are united, but before the edges are brought together all surplus skin should be removed, so that when the edges of the skin are brought together the skin will come up snug against the abdomen, which will aid the inner layer in supporting the ligated neck of the hernial sac and the abdominal weight over that region.

If the intestines are adherent to the sac this method must be modified. In that case the hernial sac will have to be opened and the adhesions broken down if possible. In two cases on which I operated I excised the adherent part and performed intestinal anastomosis. This part of the operation was successful, but after a time the suturing at the ring relaxed and I again had a hernia. Had I used ligation of the sac I think it would have prevented the recurrence.

After the completion of the operation the animal is released in clean quarters, and no further treatment is given, except that it is put on a limited diet for a week.

A little post-operative swelling will follow the operation, and this is good, as it assists the cutaneous stitching in supporting the stump long enough for it to form a plug. Should the swelling become too great, drainage will have to be provided, which will, of course, greatly reduce chances of improving the original condition. Frequently the swelling can be reduced by allowing the animal more range for exercising.

In one case I operated on a purebred spotted Poland China boar pig which the owner had received from a breeder as a

gift, as he thought it valueless. The condition was completely reduced by operation, and the animal did so well following that the owner has decided to head his herd with this animal. I discouraged this idea, however, fearing that several of the offspring might become thus affected through heredity. Contrary to my advice, he is making this animal his herd boar, and it will be interesting to see what the results may be.

The reason there were fewer wrecks in the old horse-and-buggy days was because the driver didn't depend wholly on his own intelligence.—*Newark Ledger*.

A financial item says that many Wall Street men are going back to the farm. They ought to be especially proficient when it comes to watering the stock.—*Southern Lumberman*.

THE JOURNAL has been informed that Dr. James A. Waugh, of Pittsburgh, Pa., is a grandfather, a grandson having been born February 23. Grandfather Waugh, who still feels his years lightly, has passed his 66th birthday. THE JOURNAL extends congratulations to Grandfather Waugh.

We are informed that Dr. N. Rechtenwald has retired from active practice at the good old age of 77. THE JOURNAL extends best wishes for many years to enjoy his well earned rest.

Dr. W. E. Dingus, formerly in the Army service, is now located at Smallery, Kentucky, where he is veterinarian for the Pivot Rock Coal Company.

Cattlemen in the Chubut district of Argentina have just disposed of about 500,000 3-year-old steers. The average price was about \$3.50 U. S. money.

Senior students in the Veterinary Division of the Michigan Agricultural College gained valuable field practice and experience last month when they worked with the Federal tuberculosis squad in Livingston County. Each senior traveled with a Federal inspector, serving as his assistant during the country campaign.

A NEW PARASITE OF THE PIG¹

By JAMES E. ACKERT and FLORENCE KING PAYNE

Agricultural Experiment Station, Kansas State Agricultural
College, Manhattan, Kansas

WHILE investigating the relation of the domestic pig to the spread of human hookworm disease (Ackert and Payne, 1922) in Trinidad, British West Indies, the writers discovered in the native pigs a nematode resembling the human hookworm, *Necator americanus*. As the experimental pigs in which the new nematodes were found had been fed large numbers of infective larvae of *N. americanus*, it was first thought that the new worms were similar to this human species. But morphological studies on living and preserved specimens convinced the writers that the pig form represents a new species, for which the name *Necator suillus* has been proposed (loc. cit.).

The new species closely resembles the human *Necator* in body proportions and general appearance, but is distinctly smaller, the males averaging 6.9 mm. in length and the females 9.5 mm. while in *N. americanus* the males average 8.4 mm. in length and the females 11.9 mm. Constant morphological differences between the pig and the human forms also occur in the angles of the ventral plates, shapes of the lateral lancets and lengths of the terminal branches of the dorsal bursal ray.

For the convenience of those making intestinal examinations of pigs a brief description of the new hookworm is here given.

THE GENUS NECATOR, STILES, 1903¹

Hookworms belonging to this genus have a small mouth capsule, narrowed anteriorly (ventrally) by chitinous plates. On each side of the base of the dorsal cone is a lateral chitinous plate or lancet with a smooth edge (not serrated); ventral lancets present as in *Ancylostoma*. No ridges occurring on outside of ventral wall. Opening of the dorsal esophageal gland on tip of a cone (dorsal tooth) projecting freely into the buccal capsule. Bursa closed. Dorsal ray of bursa divided to its base.

¹Contribution No. 58 from the Zoology Department, Agricultural Experiment Station, Kansas State Agricultural College. The opportunity to make this investigation was afforded by the International Health Board of the Rockefeller Foundation through the efforts of Dr. William W. Cort, Johns Hopkins University, and Dr. George C. Payne, Trinidad Ancylostomiasis Commission.

Necator suillus, Ackert and Payne, 1922

Specific diagnosis.—With the characters of the genus. Inner edges of ventral plates rounded. Dorsal tooth very short. Lateral lancets broadly wedge-shaped in profile. Ventral lancets rather slender; dagger-shaped in side view; point toward base of dorsal tooth. Esophagus comparatively short and slender.

Male, 5.25 to 8.75 mm. long by 0.09 to 0.246 mm. in thickness; average length, 6.9 mm. Buccal capsule 57 to 75 microns long (dorsoventrally), average 65; by 58 to 77 microns wide, average 68. Bursa funnel-shaped. Dorsal rays short and comparatively stout; terminal branches of dorsal rays long and slender; externodorsal ray short and stout; posterolateral, mediolateral and externolateral rays short and slender; lateroventral and ventroventral rays stout. Spicules 0.423 to 0.471 mm. long and barbed at extremity.

Female, 7.3 to 12.5 mm. long by 0.295 to 0.382 mm. in breadth; average length, 9.5 mm. Buccal capsule 68 to 89 microns long, average 74; by 67 to 94 microns wide, average 75. Vulva near equator of body, but anterior to middle. Eggs 56 to 66 microns long by 35 to 40 microns wide, in early segmentation when deposited; average length, 63 microns; average width, 37 microns.

While *N. americanus* generally occurs in the duodenum, the pig *Necator* is most commonly found in the ileum and jejunum. However, the latter may be found in the duodenum, and, as is well known, the human form may occur in the jejunum and ileum. Judging from the bloody ulcers caused by these worms and from the emaciated appearance of the host pigs containing many worms, *Necator suillus* is of economic importance in Trinidad, B. W. I. Postmortem examinations of pigs from various parts of the island showed that both old and young pigs were infested, some containing several hundred of these hookworms.

After the foregoing observation had been made O'Connor's report (1920) of finding *Ancylostoma* in pigs was received. Working at Funafuti, Ellice Islands, O'Connor took from the small intestine of a pig thirty hookworms which resembled *A. duodenale*, except for size, being somewhat smaller than this human hookworm. Recently hookworms identified as *Ancylostoma duodenale* were reported from semi-domesticated pigs in North Queensland by Legg and Rheuben (1921).

While a large number of hookworms have been taken from

pigs in Trinidad, none of those examined microscopically belong to the genus *Anchylostoma*. The rather high percentage of infestations indicates that *N. suillus* has been prevalent in Trinidad for some time. However, failure to find these hookworms heretofore can readily be explained by the ease of overlooking them both in the intestinal contents and in the mucus on the intestinal walls.

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Topeka Daily Capital reports that officials of the Russian government are purchasing horses by the thousands in Kansas, Colorado, and Wyoming, and includes: "They are negotiating to have these horses slaughtered and the meat canned and shipped to Russia in train-load lots."

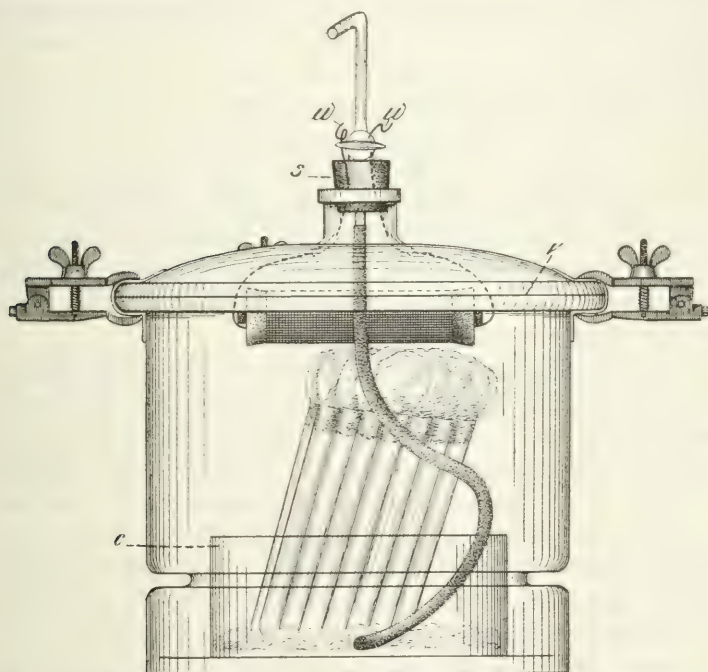
Dr. E. A. Watson, Pathologist for the Canadian Health of Animals Branch, returned to Ottawa on December 5 from duty in Europe in connection with the reindeer industry and the Hudson's Bay Company's importation of reindeer to Baffins Island. While in Norway visits were made to the Government Veterinary Institute in Christiania, comprising a block of fine buildings just erected and equipped for the study of animal diseases. At Cambridge, England, a visit was made to the new Institute for Parasitological Research which has been completed and opened. It is under the direction of Prof. G. H. F. Nuttall, and will no doubt become a great center for research in parasitology. The old laboratory known as the Quick Laboratory had attained an international reputation. Canadian veterinary research workers have always been very kindly received there and should not lose an opportunity of visiting the new institution.

NOTE ON THE BROWN ANAEROBE JAR

By WILLIAM N. BERG

*Pathological Division, Bureau of Animal Industry,
Washington, D. C.*

THE USEFULNESS of the Brown anaerobe jar may be further increased if a vacuum desiccator of the Fröhling and Schultz type be substituted for the museum jar originally described.¹ A very satisfactory Brown jar was constructed with such a desiccator, inside diameter 200 mm., inside height 220 mm. Larger ones, or desiccators of heat-resistant glass, could undoubtedly be used. The advantages are: (1) The lid is quickly and effectively sealed to the jar with vaseline. (2) The joints are easily kept tight. (3) More space is available for cultures. (See illustration.)



Brown anaerobe jar with vacuum desiccator. C, crystallizing dish;
S, rubber stopper; V, vaseline seal between ground-glass rims;
W, copper wire.

¹ Brown, J. H. An improved anaerobe jar. Jour. Exp. Med., 1921, vol. 33, p. 677.

Attaching the coil to the lid.—The glass stopcock is removed from the lid of the vacuum desiccator and replaced with a well-fitting rubber stopper (*s*) carrying a glass inlet tube for hydrogen. Two heavy copper wires (*w*), each 1.7 mm. in diameter and approximately 200 mm. long, are pushed directly through the stopper. These support the coil and carry the current. The attachment to the nichrome wire and the construction of the coil are made as described by Brown, using palladium asbestos. The larger diameter of the desiccator made it possible to construct a longer coil. The joints between the lid and the stopper, around the tube and wires, etc., are easily sealed with shellac dissolved in alcohol.

To operate.—A large glass crystallizing dish (*c*) carrying the cultures to be incubated is placed inside the desiccator. The porcelain plate is removed in order to utilize the full height of the jar. The dish is used to prevent contact between the cotton plugs and the moist sides of the jar. With the fingers vaseline is rubbed on the clean, dry ground-glass rim of the lid and of the desiccator jar. There is little danger of using too much. The lid is put on, pressed down lightly, with rotary motion to press visible air bubbles out of the seal (*v*). With a little practice, taking the lid off, replacing the cultures and again sealing the jar takes but a few minutes. When the rim has the appearance of a smooth, uniform layer of vaseline between two glass surfaces there will be no leakage. The lid is clamped to the desiccator jar with three small buret clamps.

The coil is connected with the current for about one minute, then disconnected. A 220-volt electric-light current, reduced by passage through four 120-watt carbon filament lamps in parallel, is used. This heats the coil so that it is hot to the hand. Heating to redness or for a longer period is not necessary. A towel wet with cold water is placed on the lid. Hydrogen from a Kipp generator is passed through a wash bottle containing 5 per cent silver nitrate solution into the desiccator at the rate of about two bubbles per second. Generally hydrogen enters for about 10 minutes and stops because the combustion is slow and the apparatus filled. The apparatus is allowed to stand without any change; presently, as the combustion proceeds, more hydrogen enters, slowly at first, but with increasing rapidity, until it becomes advisable to cut down the gas to two bubbles per

second. An hour is required for complete combustion and filling with hydrogen, during which time the apparatus requires only occasional attention. When hydrogen ceases to enter the apparatus a second time it is disconnected. Obligate anaerobes do, and obligate aerobes do not grow in the jar described.

FERNDALE DECIDES ON MOUNTED POLICE

Ferndale, Mich., will graduate from the small town class by establishing a mounted police force instead of its present system of patrolling with small motor cars, which the commission finds both costly and ineffective, particularly when it is desired to detour over unpaved roads.

The commissioners estimate that one mounted officer can do an equal amount of work performed by a single small car and at materially less cost.—From *Detroit Free Press*.

TO LADY SLIPPER

By N. S. MAYO

Long years have passed by, yet still in my dreams,
Your picture shines bright and your black coat still gleams.
I'll slip on the saddle and tighten the girth,
While you tug at the bit and paw at the earth.

A swing to the saddle, there's a faint squeak of leather.
We are off, you and I, for a fine time together.
A fox-trot so smooth, a canter or run,
All cares are forgotten—the world is still young.

You'll fly through the meadow, not feeling the load,
And trot through the woods, on the Old River Road.
The fence by the spring you'll clear at a bound.
Tell me where on this earth there's more joy to be found!

You have gone years ago to green pastures so free,
And there, at my passing, you'll be waiting for me.
Once more in the saddle, we'll go on together,
As we did long ago in fair or foul weather

A PROPOSED PLAN FOR THE REORGANIZATION OF THE AMERICAN VETERINARY MEDICAL ASSOCIATION ¹

By A. N. CARROLL, Pueblo, Colorado.

THE American Veterinary Medical Association, the greatest association of veterinarians in the world, is failing in the principles for which it exists. Not failing because it has not been the instigator of most of our advancement, for it has and will continue as such, but failing in that with its present membership and organization it is hampered and is but a part of what it could and should be. Failing because it lacks the ability to convince the rank and file of veterinarians that it is of inestimable value to them, in fact their greatest asset. Failing because it lacks numerical, enthusiastic support of the veterinarians and necessarily the public. Failing in that it is not sufficiently democratic. How is this condition to be corrected so that the Association will assume the position which rightfully belongs to it, becomes the paramount issue.

The development and maintenance of potent organizations is one of the necessities of the times. All big, successful enterprises and professions advance on that principle. But without loyal support of the constituents any concern, no matter what its initial strength, must weaken and fail unless cooperation is accomplished. Efficiency and power are the product of this cooperation. The average man is reluctant about conceding its advantages. An example of this has been the failure of farmers in uniting their energies, allowing all other branches of trade to become strong through organization, until during the present reconstruction they suffered such overwhelming losses. Necessity forced them to band together with the help of the county agents, and the fruits of the endeavor are unlimited. Through their Federation of Farm Bureaus, founded on the sound principle of representation, built from the bottom up, from the county societies to the State association and finally the national, they are now controlling the policies, through the Farm Bloc, of a yielding though not always complacent Congress.

¹Presented at the nineteenth annual meeting of the Colorado Veterinary Medical Association, Denver, January 19, 1922. A resolution was passed approving the plan and a committee was appointed to enlarge the idea into a better working basis.

We, like they, must build from a more solid foundation, develop one organization and one only, with one purpose and one result. We are too strong to speak of failure in the true sense of the word; but admitting our failings, it remains for us all to strengthen our Association into one large body, democratic, powerful, progressive.

I do not wish to criticise the past or present management of the A. V. M. A. or State associations. They have erred, it is true, but more in the fact of omission than commission; more in lack of numerical strength than in desire or ability. Considering the half-hearted support received from the profession as a whole, the accomplishments have been many.

I wish to offer a plan broader in its scope, more democratic in its administration and greater in its possibilities. I submit for consideration the following tentative outline, already approved by many and at present being considered by a special committee:

Commence at the bottom; create there the spirit of your organization in the minds of the individual. Champion his cause; attain his interest and keep it aroused; take a hand in his problems; dispel the spirit of competition; develop the business side as well as the professional. The prosperous man is the contented man, not contented by any means with his present accomplishments, but contented with his profession and its future. It all rests with the individual, regardless of his position. Look well to his development. Band him with his fellow workers into small groups with local interest, join the groups into State societies, making them 100 per cent in membership, loyalty and push. From this solid foundation organize the State societies into the national or continental association, still maintaining all of the power of the constituents but strong with the incentive of co-operation.

It is proposed that there be developed as many county or district groups, to be known as component societies, as is possible, by an active campaign through publicity, resident secretaries and individual activity, and that these component societies each elect two delegates and alternatives for each twenty-five members or fraction thereof, these delegates to form the House of Delegates of the State association and transact all of the business of the latter and in policy to conform to the House of Representatives as hereinafter provided.

The House of Delegates of each State, Territorial or Provincial society, to be known as constituent associations, to elect two delegates and alternates for each 100 members or fraction thereof, to form the House of Representatives of the A. V. M. A., similar to the House of Delegates in the constituent societies, which is vested with all legislative power of the continental body. The Bureau of Animal Industry and Army, as well as each scientific section, to be entitled to two delegates each. All dues shall be collected by the component or constituent association and proportioned to the various treasuries as later determined.

The general officers of the A. V. M. A.—President, Vice-President, Speaker, Secretary and Trustees—shall be elected annually by the House of Representatives, except the Board of nine Trustees, three of whom shall be elected annually to serve a period of three years and as far as possible represent the different sections of the country. The Board of Trustees to elect the National Treasurer, who shall be responsible to them as custodian of all moneys and have the approval of the Board in all expenditures. The President, to be elected from members outside of the House of Representatives, will preside at the annual meetings. He may appear before the House or Trustees and make suggestions and nominate members of all standing committees unless otherwise provided, they to be elected by the House. The Speaker shall be presiding officer of the House of Representatives. He may appoint special committees. The Secretary shall act as General Secretary to the A. V. M. A. as well as Secretary to the House of Representatives.

The Board of Trustees shall superintend the publication of the JOURNAL, shall appoint a General Manager and Editor, such assistants as necessary, and determine their salaries, condition of employment and general policy. During the intervals between the regular sessions of the House of Representatives the Board of Trustees shall supervise action of regular committees and may appoint emergency committees.

The annual meeting shall be known as the scientific assembly, a convocation of all members for the presentation and discussion of subjects pertaining to the science and art of veterinary medicine. This assembly shall be divided into as many sections covering separate branches of the profession as may be determined necessary by the House of Representatives.

This general plan is known as a federacy where the component and constituent societies are to be entirely self-governing in all local matters but shall conform to the Constitution and By-Laws of the A. V. M. A. and be directed by it in matters of general policy.

The above outline will give a numerically strong and loyal foundation, create representation from every section, confine the business of the meetings to the hands of a few well-chosen delegates, assuring mature deliberation, developing the weaker points without hampering the stronger, eliminate sectional and factional discord, in fact initiate the soundest form of organization. In this way and this way only, by systematic cooperation, can we keep pace with this, the Progressive Age.

The Colorado State Board of Livestock Inspection Commissioners has decided to add its influence in favor of the horses as against the tractor. Draft teams, it was pointed out, are the need of the hour on the farm and American horse breeders can gain considerable encouragement by the movement now fostered by the American Horse Association.—*Denver Daily Record Stockman*.



CLINICAL AND CASE REPORTS

(Practitioners and others are invited to contribute to this department reports of unusual and interesting cases which may be helpful to others in the profession.)

COMPLETE FRACTURE OF THE JAW IN A HOG ¹

By H. L. McMILLAN,

Estherville, Iowa

THE PATIENT was a 400-pound boar about a year old. The owner turned this one and another out in adjoining exercise lots, and they got to running up and down the woven fence, making slashes at each other with their tusks. Before the owner could get them back into their pens one had caught his tusk in the fence and completely torn loose a portion of the mandible. It broke off just posterior to the socket of the tusk and completely split in the median line, anteriorly. It was considered very doubtful as to the outcome of any sort of treatment, but as the animal was highly valued and there was everything to gain and nothing to lose it was decided to try suturing the broken ends.

As only the owner and myself were present, the operative technique was necessarily very simple. After complete chloroform anesthesia was obtained, the mouth was forced open. The mucous membrane and submucosa were dissected off down to the periosteum on the internal and external surfaces of both fractures. Small holes approximately one-sixteenth of an inch in diameter were drilled through the bones three-quarters of an inch from the broken edges. Then two interrupted sutures were formed at each end of the loose piece of bone, using doubled coarse silver wire. The greatest trouble encountered was twisting off the silver wire before sufficient tension was applied. For this reason I would use copper or some other wire in a similar operation.

The wounds were carefully washed and swabbed out and received no further attention. The animal was kept on slops and soft feed for two weeks. After the first day he did not miss a feed. There was moderate swelling for the first week. At present callous formations the size of the little finger can be felt on

¹ Presented at the thirty-fourth annual meeting of the Iowa Veterinary Association, Des Moines, Iowa, January 17-19, 1922.

either end of the break, but his teeth are perfectly lined up and even the tusk is in its proper position.

ACRIFLAVINE IN OPEN JOINTS¹

By H. L. McMILLAN

Estherville, Iowa

A PRELIMINARY REPORT is made on the use of acriflavine solution in the treatment of open joints in the horse.

Case 1 was a driving type pony which was kicked on the external surface of the leg and the calk perforated the lower pouch of the femoro-tibial joint capsule. When I saw her three days after the accident she would not touch the foot to the ground. There was considerable swelling and pain over the entire region of the joint; she was off feed and gaunted up badly. I advised the owner to bathe the leg well with hot water and left him a syringe, with instructions to inject a small amount of 1-1,000 acriflavine solution three times daily, and if she was no better in a few days to put her out of misery. My main reason for using the acriflavine in this case, I must admit, was its cheapness. What was my surprise when he returned the syringe in ten days and said he was using her as she was completely recovered and the wound practically healed.

Case 2 was a runaway accident in which the horse kicked a sharp bolt on the buggy which cut down through the posterior annular ligament, exposing the flexor tendons; so this was an open tendon sheath, and not a joint. This case was treated soon after the accident. After trimming the wound a pack was applied wet with 1-1,000 acriflavine solution. This pack was changed twice daily at first, later once daily, and finally once every two or three days. There was no pus formation and very little swelling, so it made an uneventful healing in two weeks.

Case 3 was a twelve-year-old mare which got a bad wire cut across the front of the hock joint. She was neglected for a week and when first seen was off feed, gaunted up badly and would not put the foot to the ground. The entire joint region and leg were badly swollen; temperature 104°F. There was a free discharge of synovia mixed with pus. Treatment consisted in bathing the leg with hot water twice daily and injecting a small

¹ Presented at the thirty-fourth annual meeting of the Iowa Veterinary Association, Des Moines, Iowa, January 17-19, 1922.

amount of 1-1,000 acriflavine solution as deeply as possible into the joint capsule. Two days later the joint ruptured on the postero-internal surface. However, it was not possible to inject from one opening to the other, so both were treated. In three weeks the swelling had practically gone, both wounds completely closed and all discharge ceased. She was turned in pasture every nice day and played with her mate as usual, but to this day she will not use that leg, although the joint is perfectly mobile, no local pain on pressure, and apparently normal in every way except the slight enlargement.

Case 4 was a puncture wound in the postero-external portion of the hock joint, which became very badly infected before it was found. The leg was swollen from above the hock to the foot, the animal lying down practically all the time, but would eat and drink when feed and water were brought to him. After a thorough cleansing, a large pack wet with 1-1,000 acriflavine solution was applied and kept moist for thirty-six hours. Thereafter a small amount of this solution was injected twice daily for a week, then once daily. This joint also ruptured on the inside after a few days. Now, after five weeks, the swelling has gone down pretty well and the discharge has practically ceased. The horse is picking up in condition and handles himself quite well, so it looks as if he will make an uneventful recovery.

These are all the cases on which I have had a chance to try out this line of treatment. They are not, of course, enough from which to form definite conclusions as to its real value. However, as may be seen from these few cases reported, the recoveries and amount of treatment necessary have been above the average for this class of cases. I hope that some will take sufficient interest to give this line of treatment a fair trial, so that we can learn good or bad points that may be brought out at some future meeting for the good of all.

ACRIFLAVINE AND PROFLAVINE ¹

By N. S. MAYO, Chicago, Ill.

IN the *British Medical Journal* of October 29, 1921, C. H. Browning, M. D., D. P. H., Professor of Bacteriology, University of Glasgow, and J. B. Cohen, F. R. S., Professor of Organic

¹ Read before the Chicago Veterinary Association.

Chemistry, University of Leeds, have an excellent article on "The Chemotherapy of Pyogenic Infections with Special Reference to the Antiseptic Properties of Acridine Compounds." The following excerpts are taken from this article:

Under the conditions of the test the sterilizing concentration of acriflavine as determined by the modal value obtained in an extensive series of experiments is for *Staphylococcus aureus*, in peptone water 1 to 100,000, in serum 1 to 200,000; for *B. coli*, in peptone water 1 to 20,000, in serum 1 in 100,000. The striking result therefore appears that this substance is not reduced in its antiseptic power by serum.

Proflavine was found to be practically indistinguishable from acriflavine in antiseptic action.

In rabbits it is possible by means of intravenous injections of proflavine, which do not affect the health of the animal, to render the serum bactericidal for several hours when tested in vitro with *Staphylococcus aureus* and *B. coli*.

Doses of 0.33 gram of proflavine sulphate in physiological saline have been given intravenously at this rate to adult subjects without untoward effects beyond transient sickness. The skin becomes stained of a yellow tint, which, however, completely disappears in the course of twenty-four to forty-eight hours. The dye is excreted by the kidneys, and, as estimated from the absorption spectra by Dr. S. Russ, fully a third of the amount administered can be accounted for in the urine passed during the subsequent two days. There is also excretion of the substance by the bile in the monkey.

Thus, it is a fact that large wounds may be treated with acriflavine solution (1 in 1,000) for weeks without disturbance in the development of granulation tissue or interference with epithelial ingrowth.

To summarize the results relating to antiseptic powder and toxicity, it may be said that the diamino-acridine compounds possess much more powerful bacteriostatic and bactericidal action in comparison with their toxicity for mamalian tissues than any other substances hitherto investigated. In addition, they are stable, and do not become inactive though undergoing chemical changes in the tissues. These, and certain other compounds referred to later, are the only powerful antiseptics which are not reduced in their activity by protein solutions such as serum.

CASE REPORT

From the above it will be noted that proflavine is equally efficient as an antiseptic as acriflavine. This is important to veterinarians, because proflavine is cheaper. It is not as readily soluble as the acriflavine, but solutions of proflavine 1 to 300 can be readily made.

The dosages of the flavines for intravenous injection that have been recommended are for sheep and swine 50 mls of a 1 to 1,000 solution, and for horses and cattle 150 mls.

On March 7 an aged gray mare, weighing about 1,000 pounds, was given 650 mls (c.e.) of a 1 to 1,000 solution of proflavine in physiologic saline. The proflavine solution was administered

by gravity through a No. 16 hypodermic needle thrust into the jugular. The solution was warmed to approximately body temperature, and the time required to administer this amount of the proflavine solution was ten minutes.

No untoward symptoms were noted except a very slight salivation, probably due to slight nausea, the result of the intravenous injection.

On March 9 the same animal was given 705 c.c. of a 1 to 300 solution of proflavine in physiologic saline. The time required for its introduction by gravity, through a No. 16 hypodermic needle thrust into the jugular, was five minutes. This amount of solution contains 2.35 grams of proflavine.

After a few minutes following the introduction of the solution there was slight salivation, as in the previous instance. In about twenty minutes the visible mucous membranes showed a decidedly yellow tint that increased later to a very marked yellow color. The urine also became so yellow that the hind legs were stained yellow by it. No ill effects other than a slight salivation were noted.

It will be seen that it is possible to give very large doses of proflavine intravenously without serious disturbance of the animal's economy. As the flavines seem to be particularly efficient as antiseptics against the cocci group of organisms, proflavine may prove to be very valuable as a treatment of systemic infections of organisms of the cocci group.

FOREIGN BODY BETWEEN TEETH OF HORSE

AT A RECENT MEETING of the Chicago Veterinary Society Dr. John Jaffrey reported an interesting case of a horse that was brought to Jaffrey Brothers' hospital showing symptoms of salivation with a champing of the jaws.

An examination with an electric light showed a piece of a limb of a tree, about three-fourths of an inch in diameter, firmly wedged between the upper molars. Considerable force was required to dislodge it. There was a necrosed area about the size of a dollar at one side of the tongue, and also a small area on the roof of the mouth.

The owner reported that another veterinarian had examined this horse six days previously and had given the owner a box of ointment to rub on the outside of the horse's throat.

ABSTRACTS

REPORT ISSUED TO THE MINISTER OF AGRICULTURE, COMMERCE AND TRADE OF HOLLAND, BY THE HEAD OF A COMMISSION APPOINTED TO INVESTIGATE MATTERS CONCERNING FOOT-AND-MOUTH DISEASE. L. de Blicck and A. J. Winkle. Bijlage VII, August 20, 1919, Utrecht.

The investigations of the Commission were divided into three sections.

1. Testing the immunizing properties of blood from cattle which had recovered from foot-and-mouth disease when injected into susceptible animals in herds in which the disease had just made its appearance.

As many fatalities occur among young calves during the progress of the disease in herds in which the calves were kept, the main attention of the Commission was directed to the protection of this class of animals. It was found that test calves could be protected from an injection of 1/3 c.c. of fresh virulent serum if injected subcutaneously with 150 c.c. of blood serum from a cow that had survived an attack of foot-and-mouth disease for four or five weeks. The immunizing injections were given simultaneously with the virus, or within eight hours of such injection.

2. Investigation of the effects of "trypaflavine."

"Trypaflavine" is a salt derived from a group of acridin dye stuffs, which had been previously found effective in protecting mice against inoculations with nagana by Loeffler and Benda.

The conclusions of the Commission were that "Trypaflavine" as now placed upon the market has no value in the control or suppression of foot-and-mouth disease.

3. A few tests of the virulence of various products of foot-and-mouth lesions and of means of producing active immunization.

The virulence of lymph for cattle was found to be very marked in all tests. 1/350th of a c.c. injected intravenously invariably produced characteristic symptoms of the disease in yearling cattle in one to three days. The writers found that blood from animals affected with foot-and-mouth disease varied greatly in virulence. Red blood corpuscles that had been subjected to

washing twelve times in succession remained virulent and required more time in which to produce the disease than fresh blood of the same drawing.

Attempts to devise a reliable method of immunizing cattle against foot-and-mouth disease failed. One calf and one pig failed to develop the disease when given the final test injection, but most of the test animals showed fever and developed vesicles within six days.

They obtained fresh serum in May, 1919, stored it under paraffin oil, and tested its virulence at intervals until January, 1920. Although considerably weakened at the latest trial, a single passage through a calf was sufficient to give it its full original power again.

H. J. WASHBURN.

THE ACTIVE IMMUNIZATION OF HORSES AGAINST TETANUS. J. B. Buxton. *Vet. Jour.*, vol. 77 (1921), no. 12, p. 445.

The production of active immunity against diphtheria as a result of injections with more or less neutralized mixtures of diphtheria toxin and antitoxin has been definitely established.

To determine whether such a procedure would result in the production of an active immunity against tetanus, the author and his colleagues treated several horses with neutral mixtures of tetanus toxin and antitoxin. After an interval of several weeks the horses withstood an intramuscular injection of sterile garden soil together with 2 c.c. of an actively growing culture of the tetanus bacillus representing many fatal doses.

The author states that the expectation that active immunity will be produced by the injection of tetanus toxin and antitoxin is justified by experiment.

H. W. SCHOENING

RECOVERY FROM FISTULA IN THE CECUM OF THE HORSE. L. Pelka. *Monatshefte für praktische Tierheilkunde*, vol. 32 (1921), p. 399.

Case I. Horse with wound, 3 inches long and an inch wide, on the right side, about an inch from the linea alba, immediately behind the last rib. Probably a barbed wire cut 8 to 10 days before. The author washed the wound with 3 per cent lysol solution. In the next few days there was local swelling with dis-

charge of food masses from the opening. From the direction of the irrigation tube and palpation with the finger, diagnosis of fistula of the cecum at the apex was made. Treatment. The horse was put on half rations. Two liters of 1 per cent lysol solution were infused into the cecum. Edges of wound were daily treated with 1 to 10 solution of zinc chloride, covered with heavy layers of cotton and a truss applied. This was a heavy leather plate, 20 inches long, 16 inches wide, provided with suitable belts and buckles to keep it tightly in place. An opening 3 by 2 inches was cut in the truss over the wound, to permit free discharge from the fistula. There were adhesions between the edges of the wound in the cecum with those in the abdominal wall, but there was no union by scar tissue. In the next eight days there was local necrosis and pieces of abdominal muscle sloughed off; the opening having become larger, the truss was taken off. The opening of the truss was closed with a wooden plate carrying a heavy pad of corrosive sublimate cotton. After irrigating the cecum and cauterizing the wound with zinc chloride, the truss was put on so that the pad sat snugly over the fistula. At first the pad was changed four times daily, later, twice daily. The wounds became smaller daily and recovery followed in three weeks, leaving a small hernia. The horse was still at work a year and a half afterwards, the hernia producing no ill effects.

Case II. A two-year colt tried to jump a fence; a projecting nail inflicted a wound in the abdominal region from which food came out. Wound was seven inches long by one inch wide, running straight backward from a point an inch on the right side of the median line close to the insertion of the fifth rib. The author washed the wound with lukewarm 1 per cent cresol solution. A rubber tube could be introduced 15 inches through the opening toward the right hip. Diagnosis: Penetrating wound of abdominal wall and cecum. Treatment: Edges of wound were cauterized with zinc chloride solution. As a precautionary measure, a fenestrated truss was applied. It was feared that the adhesion of the intestinal wall to the peritoneum was not firm, and that the pressure of intestinal contents, with a closed bandage might disrupt the union, with generalized infection resulting. Ten days later the colt was making a good recovery, with only a slight discharge. In view of the previous

experience, a similar truss was put on, provided with a sublimate-cotton pad an inch high, changed twice daily. Complete healing of fistula occurred in three weeks. A pigeon egg sized hernia was all that was visible a half year later. There was no fever in either case.

W. N. BERG.

BOVINE TUBERCULOSIS. E. H. R. Harris and R. S. Williams.
Jour. Hyg., vol. 20 (1921), p. 132. (Abs. in Amer. Rev.
Tuberc., vol. 6 (1922), p. 15.)

The material forming the basis of this report was derived from a central clinic in a large industrial county borough and from a series of smaller clinics. The total population of the area exceeds 200,000. The cases analyzed were drawn from records of 4,000 individuals examined. Approximately 50 per cent of these were diagnosed as suffering from tuberculosis; about 10 per cent or 400 persons showed evidence of nonpulmonary tuberculosis. Of these, tuberculous cervical adenitis was the predominant type. Of 331 cases, 217, or 65.5 per cent, gave no history of tuberculosis in the family; 86, or 25.9 per cent, gave a history of tuberculosis in near relations, and 28, or 8.4 per cent, in more remote relations. The possibility of family contact in the two large groups of glandular and bone and joint cases are very similar. Of the 250 cases of open pulmonary tuberculosis there was no family history in 126, family history in a near relative in 105 and in a remote relative in 19; constituting 24.2 per cent for glands of the external group, 26.7 per cent for joints, and 25.9 per cent for the 331 cases of other "tuberculous disease." The figures given suggest that the family histories of cases of tuberculosis, if taken in sufficient number, would constitute valuable collateral evidence of the extent of bovine infection. The lower the figure of positive family history in a near relative, the more likely are the lesions to be of bovine origin. More investigations by tuberculosis officers into the family histories of cases of tuberculosis might prove of great value in indicating the probable extent of bovine tuberculosis in the districts with which the officers are concerned, the extent to which it may vary in one district compared with another, and the relative proportions of cases of human and bovine tuberculosis found in districts of different types, as, for instance, in purely indus-

trial compared with purely agricultural regions. This paper makes it clear that contact infection is not so common in cases of "other tuberculous disease" as in pulmonary infections. There must, therefore, be some other factor at work in these cases.

TUBERCULOSIS ANTIGENS IN MILK OF TUBERCULOUS COWS. B. Epstein. *Jahrb. f. Kinderhk.*, vol. xev (1921), p. 64. (Abs. in *Amer. Rev. of Tuberc.*, vol. vi (1922), p. 16).

Intracutaneous injections of milk from tuberculous cows were made in children having positive tuberculin reactions and showing clinical evidences of tuberculosis. The test was performed with 0.1 c.c. of milk, and the result observed in 24-48 hours, as in the intracutaneous tuberculin reaction. Of 35 injections with milk from tuberculous cows (26 of which had pulmonary tuberculosis and 9 positive tuberculin tests but no clinical tuberculosis), 18 positive and 3 doubtful reactions were noted. Of 13 injections with milk from apparently sound cows (no tuberculin tests), 4 were positive. In 10 instances, milk from cows with negative tuberculin tests was injected, no positive results being observed. Three injections of a preparation of dried milk were also negative. Moreover, milk of tuberculous cows which gave positive intracutaneous tests in tuberculous children, failed to give a reaction in children with a negative Pirquet test. Positive milk reactions caused a flaring up of old or mild Pirquet tests, although milk from sound cows was without effect in this regard. On the basis of these experiments, it is concluded that the milk of tuberculous cows frequently contains tuberculosis antigens which are not present in the milk of nontuberculous cows. The fact may be of some importance in future studies on immunotherapy.

THE SIGNIFICANCE OF THE BACILLI CARRIER WITH REGARD TO THE SPREAD OF FOWL CHOLERA. R. Manninger. *Allatorvosi Lapok*, 1921, p. 3. (Abst. in *Deut. Tierärztl. Wehnschr.*, 1921, p. 537).

In accounting for outbreaks of fowl cholera on farms where the introduction of the infection from outside sources could be definitely excluded, it has generally been accepted that the fowl

cholera germ exists in saprophytic form in the ground, in pools, and in the digestive tract of healthy birds, and occasionally causes infection when the animals are in a state of lowered resistance. This view is not supported by adequate observations. The results of the experiments of Hertel and Müller, in which birds were artificially infected with fowl cholera bacilli, but did not actually sicken yet did pass virulent organisms in the urine for months, would argue against the correctness of the above view and tend to point to bacilli carriers as a factor in spontaneous outbreaks. The author reports an observation on a hen which could be considered a bacilli carrier under natural conditions. After the outbreak of fowl cholera on a well isolated farm following the introduction of the virus from without, the disease was promptly checked after vaccination with fowl cholera vaccine and disinfection. After a lapse of half a year, a spontaneous outbreak occurred which could be associated with a hen affected with a chronic periarticular inflammation. There was found in the region of the diseased joint an old encapsulated abscess with highly virulent fowl cholera bacilli. The origin of this lesion could be connected with the first outbreak of the disease. From time to time the cholera bacilli might have gained entrance to the blood stream of the affected animal and be excreted through the kidneys.

L. T. GILTNER.

AGGLUTININ FORMATION AFTER INTRAVENOUS INJECTION OF VACCINES AND THE INFLUENCE OF NONSPECIFIC PROTEIN TITER.

A. Hofmann. Ztschr. Hyg. u. Infektionskrank., vol. 93 (1921), p. 18.

The statement that specific agglutinins can be made to appear in the blood stream by nonspecific protein injections, is disputed, especially in the work of Weichardt and Schrader. The pitfalls in comparative studies in agglutinin formation are pointed out. In careful studies on the rate of specific agglutinin formation after intravenous injection in rabbits of dead *B. coli* and *B. paratyphosus* B, there is noted a latent period of about two days in which agglutinins do not appear. On the fourth or fifth day the agglutinin formation takes place all at once; i.e., there is not the gradual rise observed by certain workers. The flood of agglutinins does not subside for weeks and even months,

and tends to remain at the high level reached about the fifth day. According to Hofmann, the agglutinin titer does not show the gradual rise and fall frequently described. It does show a short latent period, an explosive agglutinin formation taking but a day or two, followed by high agglutinin level. In 23 experiments in which rabbits were injected with deuterioalbumose, sodium nucleinate, and a few milk preparations, a rise in a specific agglutination titer against *B. typhosus* was not found. There is no doubt that good results are being obtained in the protein therapy; the theory underlying the treatment, however, is questioned. Progress will be hastened when a correct theory of the action is obtained.

W. N. BERG.

INFECTIOUSNESS OF BOVINE TUBERCLE BACILLUS DURING THE WAR. F. Schaeffer. *Ztschr. f. Tuberk.*, Vol. xxxii (1920), p. 193. (Abs. in *Amer. Rev. of Tuberc.*, vol. vi (1922), p. 6).

There is no question but that the tuberculosis mortality in Germany during the war increased greatly. Whether morbidity increased has not, as yet, been adequately shown. In order to determine this three avenues of approach were used: 1. Autopsies and clinical studies on man. 2. Autopsies and clinical studies on cattle. 3. Observations of the hygienic milk regulations during the war.

1. *Autopsies and clinical determinations on man:* The available data point to an increase in the incidence of abdominal tuberculosis, but the number of cases examined is not considered sufficient to warrant any definite conclusions on this point.

2. *In cattle slaughtered and examined routinely for tuberculosis* the percentage was found to be less during the war than before, so that the chances for an increase in tuberculosis from this source should not be expected. These statistics were based upon killings in Prussia and throughout Germany mounting into many millions of animals.

3. *Hygienic milk regulations:* Although milk regulations were lax during the war, there was no demonstrable increase in the tuberculosis caused by ingestion. This is accountable to the wholesale slaughter of cattle for war demands, with even more than usually rigid government rejection of all tuberculous carcasses. More chance for infections arose in the consumer's household, where the recommendation to cook raw milk for a short time was probably not

heeded because of the scarcity of fuel and the increased amount of work falling upon mothers during the war.

GOVERNMENT CONTROL OF BOVINE TUBERCULOSIS IN GERMANY.

H. Haupt. Ztschr. f. Tuberk., vol. xxxiv (1921), p. 43.
(Abs. in Amer. Rev. of Tuberc., vol. vi (1922), p. 2).

Manifest tuberculosis of cattle includes advanced pulmonary tuberculosis, or tuberculosis of the udder, uterus or intestines. This is reportable to the official veterinarian, who institutes proper measures which may consist in slaughtering condemned animals. *Disposition of milk*: Milk from such animals must not be used, or sold or given away unless heated to a certain temperature and for a certain time. Milk from animals with diseased udders must not, even after heating, be used for human consumption. *Suspects*: Suspected cattle must be isolated in special stalls and be marked; if they are suspected of tuberculosis of the udder the milk must be heated properly before being disposed of. The prophylactic procedure with animals with manifest tuberculosis or animals that are probably tuberculous is to brand them. Rules for their isolation, for the use they may be put to, and the method of slaughtering are contained in the original law and are controlled by the government. This leaves the killing of evidently tuberculous cattle, except those with tuberculous udders, to the decision of the owner. *Routine of inspection*: The official veterinarian examines the animal, if it is suspected or has pulmonary tuberculosis, by making proper tests and sending specimens to the laboratory for bacteriological diagnosis. He issues orders concerning isolation, labeling, and disposal of the animals, warns the owner of the dangers of the milk and informs him of voluntary measures of tuberculosis control. If tubercle bacilli be found, the presence of tuberculosis is established; and the official can order the animal to be killed (with tuberculous udders) or be otherwise disposed of (by the owner). If no tubercle bacilli are found, isolation is then revoked. The clinical picture of tuberculous animals is described as follows: Dull appearance, tight hide, rough hair and palpable lymph nodes were found in 50 per cent. Cough (spontaneous or after moving about) was present in 55 per cent of cases with open tuberculosis, in 15.6 per cent of closed, in 6.9 per cent of

cases of nontuberculous nature and in 22.5 per cent of healthy animals. Rales are the most important symptoms of pulmonary tuberculosis in cattle. The voluntary disposition of tuberculous cattle by the owner does not prove satisfactory.

NEUROTROPIC AFFINITY AND PURIFICATION OF VACCINE VIRUS. C.

Levaditi and S. Nicolau. *Compt. Rend. Acad. Sci.*, vol. 173 (1921), p. 870.

After two testicular passages in rabbits of the vaccine virus (such as is used for human vaccination) the authors succeeded in infecting a rabbit by intracerebral inoculation, and later they were able to make more than 50 cerebral passages in rabbits. The inoculations were made in the same manner as for passage of fixed rabies virus. A dose of 0.2 c.c. cerebral emulsion was used: the rabbits died in from 4 to 6 days, sometimes in 24 hours, with symptoms of paresis. The animals allow the head to droop, they move about very little, and remain in whatever position they are placed in. The cerebral vaccine retains intact or even to a greater degree its properties for attacking the cornea, skin, and testicles. It is virulent when inoculated intravenously in a rabbit which shows a beautiful generalized vaccine rash after 3 or 4 days. This generalized condition is often fatal, while with the cutaneous and ocular vaccination this is not always the case. Most of the rabbits inoculated on the cornea or in the skin survive; those which die show the virus in the brain.

The cerebral virus can be obtained in an absolutely pure condition, and it is endowed with remarkable vaccinal properties. It can be preserved perfectly in glycerine, and the brain which contains the virus lends itself very nicely to the preparation of a homogeneous pulp. Tried on a monkey there was produced a beautiful vaccinal eruption of the skin. L. T. GILTNER.

PURE CEREBRAL VACCINE VIRUS. VIRULENCE FOR MAN. Levaditi and Nicolau. *Compt. Rend. Acad. Sci.*, vol. 174 (1922), p. 249.

In a series of tests it was shown that vaccine virus passed through rabbits by intracerebral inoculation for a period of eight months (110 passages) does not lose its affinity for the skin of man. Inoculated into the new-born, sucklings, and adults, it pro-

duces vesico-pustules similar to those of ordinary vaccine. There is no tendency to generalization and the vaccination is attended with no complications. It has the advantage over ordinary vaccine in being in a state of absolute purity without the addition of any antiseptic. Its virulence is quite constant, and its vacinal properties are preserved for a long time either in the ice box, or at ordinary temperature. L. T. GILTNER.

REVIEW

VETERINARY HYGIENE. By R. G. Linton, M. R. C. V. S., Professor of Hygiene, Royal (Dick) Veterinary College, Edinburgh. One volume of 429 pages, with 92 illustrations. Published by William Wood & Company, 1921. Price, \$6.00.

The author states that this publication "has been written in the hope that it will be of assistance to veterinary students, veterinary practitioners, and others concerned with the well-being of animals." The subject matter has been divided into 7 sections, as follows:

Section I.—Water.—36 pages.

Section II.—Meteorology.—13 pages.

Section III.—Sanitation.—26 pages.

Section IV.—Air and Ventilation.—34 pages.

Section V.—Building Construction.—83 pages.

Section VI.—Preventive Medicine.—180 pages.

Section VII.—Sanitary Law.—43 pages.

This recent work is one of the best that has yet appeared on the subject of hygiene, and it is evident that in preparing it the author has given special attention to certain branches of public health work with which veterinarians engaged in veterinary state medicine should be conversant.

Hygiene occupies a more conspicuous place than ever before in medical science. The trend of both human and veterinary medicine is toward prophylaxis and as we learn more of the etiology of diseases the more we are impressed with the importance of hygiene in livestock production. There appears to be no doubt that such a well written book on such an important subject will be welcomed by the veterinarians of the United States.

U. G. H.

ASSOCIATION NEWS

LOOKING TOWARD ST. LOUIS

Members of the Association who wish to be on the program for the fifty-ninth annual meeting of the A. V. M. A., to be held in St. Louis, August 28 to September 1, should get in touch with the various Secretaries of the different sections. It is especially desirable that practitioners should volunteer to present papers on subjects that will prove helpful to their colleagues in practice, as it is the desire of the Association officials to make the next convention a practitioners' meeting. The Secretaries of the sections are as follows:

Section on General Practice, H. E. Kingman, Ft. Collins, Colo.

Section on Sanitary Science and Police, H. Preston Hoskins, Box 471, Detroit, Mich.

Section on Education and Research, L. W. Goss, Columbus, Ohio.

MEETING OF A. V. M. A., ST. LOUIS, MO., TENTATIVE PROGRAM FOR 1922

Monday, August 28, Opening and General Session.

Monday evening, President's reception.

Tuesday morning, August 29th, section meetings.

Tuesday afternoon, General Session and election of officers.

Tuesday and Wednesday evenings there will be a Smoker and Round Table at the Planters Hotel, with entertainment.

Wednesday, August 30th, and Thursday, August 31st, there will be clinics both for large and small animals at East St. Louis. The large animal clinic will be in charge of Dr. H. E. Kingman, director, and Dr. F. L. Stewart, assistant director. Dr. J. C. Flynn will have charge of the Canine and Feline Clinic. At the Clinics a definite program is being arranged and each part will be carried out on a definite time.

On Thursday evening there will be sectional meetings and on Friday, September 1st, general sessions.

It is probable that the sections on Sanitary Science and Police and Education and Research will have programs at St. Louis while the clinics are being held at East St. Louis, so that those who are not interested in the clinics will have an opportunity of attending interesting sectional meetings.

N. S. MAYO, *Secretary.*

ELEGANT EMBLEMS

Dr. John F. McKenna, Resident Secretary for California, and one of the leading veterinarians on the Pacific Coast says: "I think the veterinary automobile emblems are excellent, and so does every other member that I have spoken to. Not only is it a well made emblem, but it is extremely reasonable in price."

Dr. McKenna ordered 68 automobile emblems in one lot for California veterinarians and more than 80 have been sent to veterinarians in that state. California is far ahead of any other state in the Union in securing these splendid emblems. Every member of the A. V. M. A. should have one of these emblems on his car. Send \$1.25 to Secretary Mayo, and the emblem will be sent to you postpaid.

LIST OF APPLICANTS FOR MEMBERSHIP IN A. V. M. A. TO
APRIL 1, 1922

Aghion, J. E. Bey	Princ. Vet. Officer	State Domains, Sakha, Egypt.
Arango, Ernesto	O'Reilly No. 77	Havana, Cuba.
Arias, Clodoaldo	R. Almendares	Marianao, Havana, Cuba.
Barbee, J. S.	400 New Centre Bldg.	Kansas City, Mo.
Barnes, W. S.	P. O. Box 252	West Palm Beach, Fla.
Bengston, J. S.	5740 So. May St.	Chicago, Ill.
Beaumont, E. V.	800 Live Stock Exchange	Kansas City, Mo.
Bilikan, L.	107 N. Tacoma Ave.	Tacoma, Wash.
Bogue, J. A.	901 Rhode Island St.	Lawrence, Kans.
Clark, G. A.	464 Bathurst St.	Toronto, Ontario, Can.
Crawford, A. B.	U. S. Exp. Station	Bethesda, Md.
Crawford, C. I.		Overbrook, Kans.
Dufresne, D. E.	65 Dickson Ave.	St. Lambert, Quebec, Can.
Etchegoyhen, F.	Calle 25 No. 228 Vedado	Havana, Cuba.
Falk, R. W.		Canton, S. Dak.
Gladish, I. C.	Carlisle Barracks	Carlisle, Pa.
Hare, F.	Chief, B. A. I.	Haina, Santo Domingo, Dominican Republic.
Hart, C. E.	609 Archibald	Kansas City, Mo.
Hermann, A. A.	3854 Federal Blvd.	Denver, Colo.
Iduate, Angel	San Laxaro 212	Havana, Cuba.
Jardine, E. F.	Bassaterre	St. Kitts, British West Indies.
Kleinschmidt, H. R.		Merrill, Wis.
Alton, A. L.		Portage la Prairie, Man.
Lentz, J. B.	Mass. Agric. College	Amherst, Mass.
Manrique, A.	Apartado 8320	Mexico, D. F.
Marsh, H. E.		Cooperstown, N. Y.
Melvin, F. H.	P. O. Box 464	Albuquerque, N. Mex.
Mitchell, J. J.	Dept. of Agriculture	Lansing, Mich.
Mockford, J. P.	2702 Bowland St.	Greenville, Tex.
Niederauer, J. P.		Pierre, S. Dak.
Phipps, L. H.		Winnebago, Minn.

Pozo, Jose del.....	Jardin Carlos Pacheco	
	No. 11	Mexico, D. F.
Reagor, H. A.....	940 West Lincolnway.....	Kearney, Neb.
Saint, F. F.....	1721 2d Ave. N. W.....	Calgary, Alta., Can
Scheibler, J. W.....	994 Madison St.....	Memphis, Tenn.
Sperry, J. R.....	Off. of Vet., Schofield	
	Barracks	Honolulu, H. T.
Thurber, G. W.....		Loyal, Wis.
Turner, W. E.....		National Stock Yards, Ill.
Warner, S. W.....	464 Bathurst St.....	Toronto, Ontario, Can.
Wiest, S. W.....	P. O. Box 216.....	Santa Fe, N. Mex.
Wilkins, H. F.....	1015 5th Ave., South.....	Lewistown, Mont.

VETERINARY MEDICAL ASSOCIATION OF NEW YORK CITY

The regular monthly meeting of the Veterinary Medical Association of New York City was held in the Veterinary College Building, New York City, on Wednesday evening, February 1. President R. S. MacKellar presiding. The minutes of the January meeting were read and approved.

Dr. Chas. H. Higgins was the first speaker of the evening. His subject was "Specific Therapy." As an introduction he said we are fortunate that with our present knowledge of many of the infectious diseases of animals we are in a position to combat these infections much more readily than is the case with the diseases of humans; that we have repeatedly demonstrated the possibility of complete eradication of infectious diseases in animals, as for instance contagious pleuro-pneumonia and foot-and-mouth disease in the United States and glanders in Canada.

The latter was eliminated by Dr. Rutherford at a cost to the Canadian Government of \$1,500,000. At the present time a very vigorous campaign is being conducted throughout the country for the eradication of tuberculosis through the accredited-herd plan. Although contagious abortion was a vexatious problem, he hoped that with a live vaccine we would be able to control it, as was being done successfully in Great Britain.

A lively discussion in which a large number of members took part followed. Dr. Reid Blair said that glanders was well under control in New York City; that he had destroyed but 70 cases in the past year, whereas fifteen years ago he destroyed as many in two weeks. Dr. McKim asked Dr. Higgins about the tuberculosis situation in Canada. The latter said the disease was still rampant, but that a lot of work was being done

on the accredited-herd basis. The idea is that the Federal government should undertake the original weeding out process and then turn the work over to the local practitioner.

Dr. Bruce Blair reported several interesting cases in dogs. A four-months-old Boston terrier puppy was noticed getting fat rapidly for two weeks. Constipation, dull mucous membranes, pale, shallow respirations. Diagnosis: Hydro-peritonitis. Two quarts of fluid was drawn and digitalin was given. A few days later the dog was destroyed. On post-mortem two pints of fluid was found in the abdomen, heart was three times normal size, but the valves were normal.

Eight-year-old Aberdeen terrier bitch was supposed to be pregnant. Three days before delivery a black discharge was noted from vulva and the abdomen was hard and tense. Diagnosis: Pyometra. Operated on and uterus removed, with slow successful recovery.

Four-year-old mongrel male, 15 pounds, appeared dull and constipated. Vomiting was frequent and mucous membranes were discolored. Diagnosis: Jaundice. Animal was given glycerine, salol and arecoline. Recovery took place in eight days.

Dr. Reid Blair said that in the diagnosis of pregnancy the young practitioner should always be on his guard for pyometra, especially in old bitches. He also mentioned the value of arecoline for tapeworms in dogs, one-fourth grain for large and one-eighth grain for the smaller breeds, given by the mouth.

Dr. Slawson said he had been interested in pyometra cases for some time and had some success with injections of 10 c.c. leucocyte extract. He advises operation and removal of uterus as the best procedure. Dr. Slawson exhibited a pathological specimen of liver and spleen from a Boston terrier. The dog was presented for examination about November 1. History revealed lack of appetite, losing strength, vomiting and emaciation. On palpation he could feel what appeared to be a tumor in abdomen. He advised an exploratory operation, which was refused. The dog got gradually worse and was chloroformed on January 2. Post-mortem showed liver twice the normal size and spleen fourteen times normal size. The specimens were sent to Dr. Ewing's Laboratory for examination. Diagnosis:

Endothelial carcinoma which is common in human subjects, but never had seen it in dogs before.

Dr. Cassius Way gave an interesting report on the conference recently held at Ithaca.

Dr. Gannett asked if the canine practitioners had found nephritis common in dogs, as he was having quite a number of cases in his practice lately. Dr. Blair said it was a common disease in house dogs and is usually due to overfeeding, without sufficient exercise. Sometimes it occurs as a complication following distemper. He found the best treatment to be sanmetto, with liberal quantities of olive oil. A number of cases clear up and recover permanently under his treatment.

Dr. Altman asked what should be the attitude of a practitioner called by a client to examine a sick dog during the progress of a dog show. The consensus of opinion was that the doctor was acting properly in responding and making his examination.

It was regularly moved, seconded and carried that a rising vote of thanks be extended to Drs. Higgins and Blair for their contributions to the program of the evening.

J. ELLIOTT CRAWFORD, *Secretary*.

ALABAMA VETERINARY MEDICAL ASSOCIATION

The fifteenth annual meeting of the Alabama Veterinary Medical Association was called to order February 23, by the President, L. E. Beckham, in the College of Veterinary Medicine, at the Alabama Polytechnic Institute, Auburn.

Following the President's address and the report of the Secretary-Treasurer, L. L. Denson read a paper on the amputation of the supernumerary teats in cows. He described the cautery method and the flap method. E. T. Davis next described the method of draining the sinuses of the head in cattle. Each sinus was described individually and the proper method of drainage by the trephine, etc., was brought out. A. A. Miller then described certain parasites and gave the life history of the parasites that are found in the sinuses of sheep and goats.

J. L. Miller read a paper on "The Dog as a Primary Host of Parasites." He confined his paper largely to the round and flat worms found in the alimentary canal. E. Everitt next described

the principal round and flat worms found in the digestive tract, and the round worms found in the trachea of chickens. He gave definite methods of diagnosis and treatment and related his experience in using various drugs, such as oil of chenopodium.

Following this H. C. Wilson, federal veterinarian on hog cholera work in Alabama, described his method of injecting serum directly into the peritoneal cavity. He also told how he controlled "breaks" and quoted Dr. Niles, who stated that 90 per cent of hog diseases was cholera.

H. S. Stewart gave a paper on the life history of *Ascaris lumbricoides* as found in pigs.

The night meeting was confined to a general discussion of the business transactions of the veterinarian in practice. It was very interesting and profitable.

The morning of February 24, R. S. Sugg read a paper on "Anthrax Problems." He told how anthrax germs in smears of blood dried on glass and smooth paper, in the sun and sometimes in the shade, soon lost their vitality. This is due to the fact that the mature anthrax germs die before they form spores. He directed that the blood from the anthrax carcasses be collected early after death, and small pieces of gauze be rolled up and the blood taken up by it like blotting paper. This should be allowed to dry slowly and then put into a container—not air tight—plugged with cotton; then put in a secure mailing box and ship to the laboratory. He also stated that it was impossible to make an accurate diagnosis with smears alone. It is necessary to make culture and inoculation tests in order to be positive. It should be noted here that this method of collecting blood diagnosis does not apply to hemorrhagic septicemia. Dr. D. J. Meador discussed this paper and told how he had controlled an extensive outbreak of anthrax on an open range by burning carcasses very promptly after the death of the animals. This prevented flies and dogs and buzzards from distributing the infection and also destroyed infection. He also stated how the Oklahoma State authorities prohibit the indiscriminate use of anthrax vaccine. In no case is it permissible to use it until a positive diagnosis has been made by a State or federal authority.

Dr. E. R. Miller, Chemist, gave a short talk on some peculiar cases of chemical poisons. Arsenate of lead was suspected, but

neither lead nor arsenate could be found in tissues, intestines or stomach; but sulphur and lime were found in abundance, and he attributes the toxic effect to hydrogen sulphide and sulphite and calcium sulphide or sulphite.

Major I. Spalding, of U. S. Army, next gave a short talk on feeding horses and mules in the Army. Dr. N. G. Coving read a paper on "Botulism in Man and Animals." He gave the history of botulism and reported records of outbreaks in man and discussed the disease in general in animals. The important point he brought out was that the toxin of botulism was not developed in animals but in the foods before the toxin was taken into the animals.

"Why do Hogs Thump," was discussed by Dr. W. D. Staples. He said this is a symptom which was in reality a spasmodic contraction of the diaphragm, due to a toxic or some other irritant of the nerves and muscles of the diaphragm. He said also, that it was often a symptom found in pneumonia, indigestion and lung parasites.

The intradermal tuberculin test was discussed in full by Dr. C. P. Gaston, the ophthalmic test by Dr. T. M. Dennis, and the combination test by Dr. C. J. Becker. Dr. I. S. McAdory then read a paper on the location of the lymph glands in cattle and in hogs. This was followed by a discussion on the lymph glands that are most frequently involved in tuberculosis in hogs and in cattle.

Following this a general review was taken of the State and federal laws and regulations governing tuberculosis in domestic animals. The election of officers was then held which resulted as follows:

Dr. D. J. Meador of Selma, President.

Dr. R. S. Sugg of Auburn, Vice President.

Secretary-Treasurer, Dr. C. A. Cary, Auburn.

A special committee reported on the methods of the Veterinary Supply Co., of Kansas City. This report was adopted by a unanimous vote of the association. The resolution or report read as follows:

Whereas, it has come to the attention of the Alabama Veterinary Medical Association that the American Veterinary Supply Company, whose officers are Dr. A. Trickett, Dr. C. F. Jungerman and Dr. R. E. Naylor, members of the American Veterinary

Medical Association, is advertising by circular letter and catalogue that for the past twelve years they have sold to veterinarians only, but they have now changed their policy and in the future will sell to laymen direct; therefore be it

Resolved, That we, the members of the Alabama Veterinary Medical Association, do heartily condemn and disapprove of such methods.

Resolved, That a copy of this resolution be spread upon the minutes of this association and that a copy be sent to the secretary of the American Veterinary Medical Association for publication in the JOURNAL.

W. D. STAPLES.

D. J. MEADOR.

W. B. FLEMING.

On the night of February 24, the Student Veterinary Medical Association of the Alabama Polytechnic Institution gave a banquet to the members of the Alabama Veterinary Medical Association and visitors. This banquet was produced by the Local Order of the Eastern Star. It was a most delightful and entertaining evening.

On the morning of February 25, the B. A. I. and the State authorities gave an examination to graduate veterinarians who wished to be granted permission to test accredited herds. On the same day a polyclinic was held at the A. P. I. College of Veterinary Medicine. A number of cases were examined and diagnoses made. A grade Holstein heifer that had given tuberculin reaction was killed at the serum plant slaughterhouse and a postmortem was held for the benefit of the students and the veterinarians present. This was a case of generalized tuberculosis in which a large number of body and visceral glands were infected, but there was very slight infection in the lungs and no apparent infection in the kidneys. A very distinct lesion extended from the iris out through the cornea of the right eye. This heifer was only two years old and came from a tuberculous herd.

C. A. CARY, *Secretary*.

IDAHO VETERINARY MEDICAL ASSOCIATION

The old "Association of Veterinary Graduates" in Idaho is a defunct organization, and the new association wishes to appear in the "Directory of Associations" in the A. V. M. A. JOURNAL, under the new association name, the "Idaho Veterinary Medical

Association." The place of meeting is at Boise, Idaho, in January, 1921, and each alternate year thereafter. The following alternate years, the annual meetings are to be held at some place in north Idaho. The secretary, at the present time is J. D. Adams, 417 Union St., Boise Idaho.

By way of explanation, it should be stated that the old association had not functioned for years and in order to reorganize, it was thought best to incorporate under a new name. In November, 1919, a preliminary meeting was held, at which meeting a new association was organized and incorporated under the laws of Idaho as the Idaho Veterinary Medical Association. The officers of this association shall be graduates from accredited colleges recognized by the A. V. M. A. and licensed to practice their profession within the State.

The first annual meeting of this association was held in Boise, Idaho, January 26 and 27, 1921, attended by nearly all the graduate veterinarians in the State, and a splendid program was presented.

At this first annual meeting it was unanimously agreed that the 1922 annual meeting should be held jointly with the Oregon and Washington Veterinary Associations at Pullman, Washington, the first part of this year, the date to be set at a later time. However, on account of the general depression in the livestock industry, which of course, otherwise involves the prosperity of the practicing profession, the joint meeting could not be arranged. On account of not being able to have the regular annual meeting as arranged, the President, in accordance with Article XII, Sec. 2, has called this annual meeting to be held in Boise on May 11, for the purpose of transacting the regular business of the Association and presenting a short program.

J. D. ADAMS, *Secretary.*

SOUTHEASTERN STATES VETERINARY ASSOCIATION

The sixth annual meeting of the Southeastern States Veterinary Medical Association was held at the Hermitage Hotel, Nashville, Tenn., March 13 and 14, 1922. The association enjoys the distinction of having 221 members; thirty-one new ones joined in Nashville. Notwithstanding this, the Secretary is embarrassed

by some members who neglect to keep their dues paid up. A little matter of \$2.00 should not prevent any qualified man from meeting such obligations.

The program was efficiently and neatly prepared and contained the names of several specialists. These men came a long distance to render service, while some others nearer to Nashville whose names appeared on the program did not attend. It must never be forgotten that unless people at home manifest a keen interest in their welfare, outsiders will not. The Southeastern States Association should grow into a powerful and useful organization and be one of the strongest allies of the A. V. M. A.

The banquet and business session was held in the grill room of the Hermitage Hotel; the food and service were splendid. After the repast keen interest was manifested in the election of officers. The session was well attended and it is difficult to estimate whether it was the banquet or the election of officers which commanded such a large attendance.

On Wednesday afternoon a very interesting and instructive session was held at one of the large near-by dairy farms. Contagious abortion was the subject under discussion. The demonstrations were exceedingly skillful and should impress every veterinarian with the necessity of detail.

Two days were well spent and each member appeared to enjoy the occasion. The association was treated so well in Tennessee, it was decided that the next meeting would be in Chattanooga.

E. I. SMITH, *Recorder*.

ONTARIO VETERINARY COLLEGE

Dr. C. D. McGilvray, Dean of the Ontario Veterinary College, has just issued a new prospectus for the college, announcing its removal from Toronto to Guelph, in connection with the Agricultural College of Ontario.

Dr. McGilvray also has an excellent article, giving the opportunities that the veterinary profession offers to young men.

Dr. McGilvray is optimistic for the future of the veterinary profession, and we feel sure that under his able administration the Ontario Veterinary College will not only uphold its splendid record, but improve upon it.

NEBRASKA EXAMINATION

The Nebraska State Board of Examiners of Veterinary Medicine will hold their next regular examination in Lincoln, June 15. Applications should be on file not later than June 1. For information and applications, address H. H. Antles, Secretary, Department of Public Welfare, State House, Lincoln, Neb.

H. H. ANTLES, *Secretary.*

ILLINOIS VETERINARIANS GOING TO ST. LOUIS

At a recent conference of Illinois veterinarians held at Monmouth, Ill., it was officially decided not to hold the usual "bumper" meeting of the Illinois State Veterinary Medical Association in midsummer this year, but to use instead all the efforts of the members to increase the attendance of the A. V. M. A. annual meeting in St. Louis, from August 28 to September 1, inclusive. This courteous action will be deeply appreciated by the A. V. M. A. and we are assured that the Illinois veterinarians will go to St. Louis with a big representative delegation and many prospects for new members.

MORGAN HORSE CLUB HONORS STURDY MOUNT

The Morgan Horse Club of America has honored Castor, an 800-pound resistered Morgan horse bred and owned by the Government, by issuing a booklet telling of his remarkable sturdiness and endurance. Castor was one of the few horses to finish the United States Mounted Service Endurance Test of 300 miles, held last October.

During the test Castor carried 245 pounds, nearly one-third of his weight, without developing any leg trouble. His loss of only 12½ pounds during the five-day test was a remarkable part of his performance, especially considering the fact that he was by far the smallest horse in the contest.

The booklet published by the Morgan Horse Club is entitled "Morgan Horse Wins Laurels in Mounted Service Endurance Test, 1921."

COMMUNICATIONS

DIAGNOSIS QUESTIONED

TO THE EDITOR:

The case report on "Swine Erysipelas," by J. C. Quinlan, San Francisco, California, appearing on page 781 of the issue of the JOURNAL for March, 1922, attracted the close attention of the writer because it contained the statement: "I took samples of the urine and a spleen to two different laboratories—one of them Letterman General Hospital at Presidio—and they both found the bacillus of rouget plentiful in the urine."

Desiring a culture, I wrote the Hospital, and have received the following from the Chief of Laboratory Service:

March 22, 1922.

DR. A. R. WARD,
Goshen, N. Y.

DEAR SIR: The culture in question was not preserved in this laboratory. This laboratory reported the organism as *B. suis* *septicus*, and forwarded a subculture to the Army Medical School, Washington, D. C., from which a confirmatory report was returned.

Very respectfully,

E. G. HUBER,
Major, Medical Corps, U. S. A.,
Chief of Laboratory Service.

So far as the Letterman General Hospital is concerned the writer of the case report in question has introduced false bacteriological evidence to support his diagnosis. The pathology and etiology of swine diseases are complicated enough without the presentation of case reports of this character.

A. R. WARD.

ETIOLOGY OF LOSS OF MEMBERSHIP

TO THE EDITOR:

In a recent editorial, *Veterinary Medicine* (December, 1921), states: "* * * with keen regret that the A. V. M. A. is on the toboggan for the first time in its history * * *." This editor's conclusion that increasing the salaries of the officers of the A. V. M. A. and the toboggan are etiologically related is open to question.

From a recent report of the Secretary of the American Chemi-

cal Society for the year ending December 31, 1921, published in the February, 1922, number of the *Journal of the American Chemical Society*, we find that the paid membership dropped from 11,623 to 10,679, or almost one thousand in a single year. There were no increases in salaries of officers. The loss in membership—the first in twenty years—is attributed by the Secretary to the industrial depression, high costs, etc.

One of the high costs frequently overlooked is the high cost of book binding. The dues in the American Chemical Society are \$15 per year, for which three journals are supplied. To bind these at present prices costs an additional \$9.00 at least.

It is obvious that when societies like the American Chemical Society lose membership—and this society does not seem to stand alone—a corresponding loss in the A. V. M. A. membership is not necessarily a grave symptom.

W. N. BERG.

FROM RESIDENT SECRETARY FOR IDAHO

TO THE EDITOR:

It was officially announced in the February number of the A. V. M. A. JOURNAL, that I have been designated Resident Secretary for Idaho.

This signal honor, of being favorably considered by the members of this great association of men of my profession, and especially by the members of this district, is hereby acknowledged with appreciation.

I wish to express my thanks to the district representatives, the Executive Board, and especially to the fellow members in Idaho, and may their confidence in me prove to be not misplaced by any activity or inactivity of mine while acting as their secretary.

The By-Laws state that, "Each Resident Secretary shall cooperate with the Committee on Intelligence and Education and shall aid the President, Secretary, and Editor of the JOURNAL in such a manner as they may direct." I assure you that it will be my earnest purpose and my desire to give the association officials, at all times, the most hearty cooperation and shall not be unmindful of my obligations to the fellow resident members in Idaho.

Our National Secretary has already announced that an active campaign to increase the membership of the A. V. M. A. is to be made immediately, that the next meeting of the association will be held in St. Louis, Mo., August 28 to September 1, and that we are going to make this the biggest and best year the A. V. M. A. has ever had. Let us see to it that the Idaho membership shall not be found lagging in its support to our National Organization.

Our National President, Doctor Kinsley, has made a most noteworthy step, it would seem, in appointing a Special Committee "to consider plans for a closer affiliation between the A. V. M. A., and the State Local Veterinary Organizations." The accomplishing of this "closer affiliation" to my mind, will be the outstanding feature in the future development and advancement of the association. Let us hope that this will be a "Mighty Busy Special Committee."

J. D. ADAMS, *Resident Secretary for Idaho.*

ARE YOU GOING TO CALIFORNIA IN JUNE?

TO THE EDITOR:

During the first week of June—to be specific, the 5th, 6th and 7th of June—the California State Veterinary Medical Association's annual meeting will be held in Los Angeles. I have been informed that during the same part of June the Shrine Convention is to be held in San Francisco and the Rotary Club annual meeting in Los Angeles.

I have been selected by the President of our association, as Chairman of the Arrangements Committee for this meeting, and it has occurred to me, since both of the above mentioned conventions are to be held at approximately the same time, there might be an opportunity to produce for our program some veterinarians from the East, who might be coming here for one or the other. I would very much appreciate if you would make the above information a news item to appear in an early number of the JOURNAL, and would thank you for any suggestions that you might have along the lines above mentioned, as we are desirous to make this the best state meeting ever held in California.

J. P. BUSHONG, *Secretary.*

NECROLOGY

Dr. Arthur M. Perry, Inspector of the Bureau of Animal Industry, died at Omaha, Nebraska, September 29th, 1921, following an attack of appendicitis.

Dr. Perry was born at Van Wert, Ohio, December 10th, 1883, and graduated from the Cincinnati Veterinary College in 1916. He engaged in practice until appointed a veterinary inspector in the Bureau of Animal Industry in 1917. Dr. Perry joined the A. V. M. A. in 1918. At the time of his death he was Supervising Inspector at one of the large establishments at Omaha.

Dr. Perry leaves a wife and one daughter to mourn his early demise. He was a home loving man, a devoted husband and a kind father.

Dr. Charles H. McVeigh, of Hanna, Alberta, died on January 2, 1922, after a long illness. He was an Inspector of the Health of Animals Branch, having been appointed to the Field Division July 1, 1907, and worked continuously in the Province of Alberta.

Doctor McVeigh was a graduate of the Ontario Veterinary College in the year 1900, and joined the A. V. M. A. in 1921.

The end of a long and honorable career came when Dr. J. A. Couture died on March 12. Born in 1850 he was one of the first graduates of the Montreal Veterinary College. A member of a large family, it was necessary for him to fend for himself, and his early struggles and privations in obtaining his professional training would have discouraged a less determined and forceful character.

Entering the service of the Department of Agriculture in 1884, he was a diligent and faithful employee up till the time of his death. He held the very responsible position of Superintendent of the Animal Quarantine Station at Levis, and it was owing to his vigilance on more than one occasion that Canada escaped visitations of foot and mouth disease and contagious pleuro-pneumonia, both of which made their appearance in ani-

imals undergoing quarantine, but were prevented from extending beyond the quarantine.

Dr. Couture was a sincere friend to the farmers and stock-breeders of the Province of Quebec. He wrote much on agricultural subjects for the French press, and as Secretary for the Live Stock Breeders' Association was a powerful agent in improving the livestock of the country. He was greatly interested in the movement that resulted in establishing a system of records for the French Canadian breeds of horses and cattle, and did all he could to improve them.

In private life a devoted father, a devout adherent of the Roman Catholic Church, a faithful friend, he will long be mourned by the very large number who knew and loved him. The Health of Animals Branch loses one of the oldest members of its staff, and sadly brings its offering of regret to lie beside so many others on his grave.

F. T.

Mrs. Laleopoldina Schwarzkopf, wife of Major Olaf Schwarzkopf, U. S. Army, retired, died at Hotel Stolzenfels, Capellen, Germany, on April 7.

Mrs. Schwarzkopf had been in declining health for a number of years. Major and Mrs. Schwarzkopf came to Germany last November and have been living at Capellen. Mrs. Schwarzkopf will be remembered for her charming personality. She was born in Budapest, Hungary, sixty-five years ago and had lived in the United States since 1884. Most of Major Schwarzkopf's service as Veterinarian in the Army was with the 3rd U. S. Cavalry. Funeral services were held at Capellen and burial took place at the cemetery there.

In the recent deaths of Prof. Sir G. Sims Woodhead and Prof. Sheridan Delepine, the British medical profession has lost two of its eminent research workers and public health authorities who were well known also in the veterinary world because of their studies of tuberculosis and their cooperation with the veterinary profession. Both were officially connected with the Royal College of Veterinary Surgeons.

MISCELLANEOUS

DR. HICKMAN RETIRES

Dr. Richard W. Hickman, Chief of the Quarantine Division, resigned on March 31, on which date he completed thirty-four years of continuous public service in the Bureau of Animal Industry.

Dr. Hickman was appointed a veterinary inspector March 31, 1888, on the force of Dr. W. S. Devoe at Philadelphia, which was organized to combat contagious pleuropneumonia in that vicinity. On December 11, 1888, he was transferred to the force operating in the vicinity of New York City, where the disease was most prevalent. On account of his energy and his skill as a diagnostician, he was conspicuous among those veterinarians who under very unfavorable conditions accomplished so successfully the first great task assigned to the new Bureau, the eradication of contagious pleuropneumonia from the United States. As a result of this accomplishment, the ports of Great Britain were reopened to our export cattle trade, and Dr. Hickman was sent to the Union Stock Yards, Chicago, our greatest export cattle market at that time, to organize a system for inspecting and marking export cattle for identification. On May 1, 1892, he was placed in charge of the meat inspection station at New York City, where he remained until he was called to Washington November 1, 1900, to take charge of the Miscellaneous Division of the Bureau. On July 1, 1905, he was appointed Chief of the Quarantine Division, which under his able direction for seventeen years has proved an effectual barrier against any invasion of such destructive foreign plagues as contagious pleuropneumonia, foot-and-mouth disease, surra, rinderpest, nagana, Malta fever, mal de caderas and cattle fever.

Dr. Hickman was ably prepared for the important responsibilities to which he was assigned; he had a thorough training at the Veterinary School of the University of Pennsylvania, where he graduated in 1887, and thirteen years of varied veterinary experience in field work before he came to Washington, and was also an experienced pharmacist. While in charge of the meat inspection work for the Bureau in New York City, he was appointed in 1894 to the chair of cattle pathology in the New

York College of Veterinary Surgeons, and in 1899, when the New York College of Veterinary Surgeons and the American Veterinary College were amalgamated with the New York University, he was appointed professor of cattle pathology and meat inspection and a member of the governing faculty.

It was largely due to Dr. Hickman's knowledge of pharmacy that he was selected in 1920 as an alternate to represent the veterinary profession at the Decennial Convention for the revision of the U. S. Pharmacopoeia. In March, 1909, he was selected as a member of the Bureau Committee to inspect the veterinary colleges of the United States with the view of formulating regulations in cooperation with the U. S. Civil Service Commission governing entrance to civil service examinations for the position of veterinary inspector in the Bureau of Animal Industry.

It is difficult for those who have been associated with Dr. Hickman for twenty years or more to realize that he has reached the retirement age. He may justly feel proud of his thirty-four years of faithful, efficient service. He always gave the best he had and that best was of a high order. He met many strangers in the performance of his official duties and always made them friends, as his attitude toward others is generous and sympathetic.

Dr. Hickman is in splendid physical condition to enjoy the long vacation to which he is so justly entitled, and his many friends in the veterinary profession and everywhere wish him many years of happiness.

PRECAUTIONS AGAINST INTRODUCTION OF FOOT-AND-MOUTH DISEASE

The Minister of Agriculture, Provisional Government, has issued the following notice:

“At each port in Ireland where people land from vessels arriving from Great Britain, provision is made for the disinfection of persons (and their clothing), who have been employed in connection with the buying, shipping, or unshipping of animals in Great Britain, and any other person who is likely to have been in contact with animals on board ship in transit, or in any part of Great Britain.

“The present outbreak of foot-and-mouth disease in Great Britain has reached alarming dimensions, and the disease is of a highly virulent type. The malady may, at any time, extend to this country. The actual manner in which the disease is conveyed from place to place is not obvious, but it is known that persons who have been in contact with animals affected with this disease may, especially through the agency of their clothes, including their boots, carry the disease, and infect healthy stock. This explains the reason for requiring all persons in contact with animals in Great Britain to disinfect themselves and their clothing on arrival in Ireland, and it is essential that this process of disinfection should be rigidly observed, having regard to the continuous movements of people engaged in the livestock trade between Ireland and Great Britain.

“When returning to Ireland after their transactions in the disposal of animals, it is known that sometimes the clothes and boots worn by persons when actually engaged with animals or in places where animals are, are not those worn by such persons on their arrival in Ireland. These clothes may be brought with them in bags. It is, therefore, very necessary that this portion of their wearing apparel—including boots, hats, caps, etc.—should be produced for disinfection at the ports of entry into Ireland.

“Further, persons engaged in the Irish Cross-Channel livestock trade should, as far as possible, avoid the districts where the disease exists in Great Britain. They may not actually themselves be in contact with affected animals, but their clothes or boots may come in contact with material or persons which have been on places where such disease has existed and become themselves carriers of the infection in this manner.

“The entry of hay and straw into Ireland from Great Britain is prohibited, except under license, and no license has or will be granted until all danger has passed. Hay or straw may, however, arrive in this country as packing material and as manufactured articles, and any order prohibiting such entry would result in a serious disturbance of trade, and be difficult, if not actually impracticable to give effect to. Packing material of the kind frequently arrives in enclosed packages there being no outward indication of what class of packing material is being used for the contents of such packages, and it would be an ex-

tremely difficult process to trace all packages of the kind to their destinations throughout the country, where examination of the contents could be made.

"It is, therefore, urged that as soon as possible, after unpacking, such packing material be at once burned, and not under any circumstances be sold or used in connection with animals.

"Notwithstanding the many references to the present outbreak of foot-and-mouth disease in Great Britain having originated in this country, the livestock of Ireland still remains free from the malady, but it is essential that owners of livestock should daily examine their animals, and if they find any suspicious affection of the feet and mouth, the matter should be at once reported, in order that immediate steps may be taken to investigate the case.

"Vigilant examination, always of the greatest importance in a case of suspected foot-and-mouth disease, is now of special urgency, and it is suggested that in order to make the search more effective, County Committees of Agriculture, local branches of Farmers' Unions, Co-operative Societies, etc., should come together, adopt and put into operation measures designed with this object, and cooperate with the officers of the Department of Agriculture. During the County Wicklow outbreak last year, this cooperation was forthcoming, and the support so given effectively aided in stamping out the disease in that county."

From *The Irish Homestead*, March 4, 1922.

"The Problem of Foot-and-Mouth Disease" is the title of a review of the situation as it prevails in England, with a diagnosis of the disease, by Prof. W. R. Simpson, C. M. G., in *Country Life* (London). In this the author says: "Notwithstanding the strenuous efforts of the Agricultural Department, the epidemic of foot-and-mouth disease has inflicted a considerable loss on the country. This is not surprising in view of those efforts having unfortunately been handicapped by the very infectious nature of the disease, by its catholicity in attacking other animals besides cattle, and by the fact that the infective and causal agent of the disease has not been discovered, as has been the case in many of the other infectious diseases."

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SALES POLICY OF COMMERCIAL HOUSES

AT THE PRESENT TIME the indications are that there will be a stormy session at the St. Louis meeting of the A. V. M. A. The question at issue involves the sales policy of commercial houses. As matters stand, we may look forward to a session of bitter personalities and intense partisan accusations. Before proceeding along this line, it might be advisable to examine this possibility closely and ascertain whether such a session will be profitable and whether the matter might be adjudicated dispassionately and in a manner calculated to avoid the aftermath of hard feelings and possible schisms in the ranks of the veterinary profession. If we examine the subject without bias, it seems that there is no necessity for the members of the profession in general aligning themselves with one party or another in an attitude of hostility to all who disagree with them. It appears that there are several angles to the subject and that the right is not wholly on the side of one or the other.

Primarily this matter is a matter of commercial policy, and commercial policy is determined by a commercial house on the basis of what is profitable. Doubtless other arguments carry

weight with commercial houses, but policies evidently unprofitable for a given house are not adopted. Commercial houses are not in business primarily to make drugs or instruments; they are in business to make money. Hence, if a house decides that it will sell to veterinarians only, it does so because it expects to get the support of veterinarians and thereby establish a profitable business. Similarly, if a house decides to adopt the older policy of selling to druggists it does so because experience shows that in the case of that house such a business is profitable. From the standpoint of the veterinarian, there are advantages and disadvantages to him in either of these policies. The policy of selling direct to the veterinarian has the evident advantage of preventing non-professional persons, commonly referred to as laymen or the laity, according to the taste of the speaker or writer, from purchasing drugs and instruments for their own use. The disadvantage of such a policy is that when drugs or instruments are desired by the veterinarian for immediate use, these things can not be purchased from the druggist who has found it unprofitable to carry a stock for the use of the veterinarian who does not patronize him except in such emergencies. The advantage and disadvantages are reversed in the case of the house adopting the policy of selling to the druggist. This does not cover the entire topic by any means, but it illustrates the fact that there are two sides to the question. An additional point is that involved in selling direct to the consumer. There are several aspects to this problem. For one thing, the commercial drug house is here in competition with chemical houses in selling such of its products as dips. The extensive use of such substances practically removes them from the category of drugs for general purposes. It may be taken for granted that a stockman will not get a prescription every time he dips his cattle for ticks or lice, or his sheep for scabies, and that he will buy his dips as cheaply as possible from the concern which offers them at the best figure.

Under these circumstances a line must doubtless be drawn somewhere. Where? That remains to be ascertained. The question which we raise at the present time is this: What is the best way to ascertain where the line should be drawn, what policies should be approved as right and practical, and what

policies should be disapproved and frowned on? Can we ascertain this best by a prolonged, stormy session of the A. V. M. A., flavored with personalities and consisting largely of views put forth by those having commercial interests in the matter and by other persons who have given little thought to all the aspects of the case? Many of those who attend the next meeting of the A. V. M. A. will do so with the idea of enjoying the professional papers and the social features which make up a large part of the benefit derived from the meetings. Must their enjoyment be largely curtailed by a rancorous debate? Is it necessary that the disagreements of commercial houses should occupy a large part of the session, especially when a decision in regard to these disagreements may be made, with little likelihood that the decision will be a sound and dispassionate one? It would hardly seem so. Would it not be better to take the position that the veterinarian, as an interested party, would prefer to have this topic referred to a suitable committee authorized to examine the facts in the case from the standpoint of all those directly or indirectly interested, and to have such a committee formulate recommendations and report them to the association for modification and adoption? A partisan alignment on the part of veterinarians will necessarily result in some of them playing the part of cat's-paw for interested individuals. On the other hand, if the veterinarians attend the meeting in a dispassionate frame of mind, recognizing the issue but asking that it be settled without a waste of time and without laying the foundation for prolonged subsequent bitterness, it may save much unpleasantness and lead to some constructive findings.

Would it not be advisable for President Kinsley to refer this problem, which is certain to confront us at St. Louis, to the Executive Board immediately, with the request that evidence on both sides be collected as early as possible, and that the board meet a day or two before the convention to consider the question at issue? Without doubt this controversy will prove to be the most troublesome item of business that will come before the conference and preliminary steps should at once be taken to have it settled promptly and with the greatest good to the veterinary profession.

M. C. H.

PRACTICAL VETERINARIANS

NOW that the educational requirements for entrance to recognized veterinary colleges have been raised to meet the demands of modern educational standards, it is very important that the veterinary colleges of the country should emphasize the importance of the practical application of the veterinary training and particularly to those students who expect to practice in rural communities. If a farmer or stockman is a success, must be practical. Every rural community is critical and it measures a veterinarian very largely by its own standards. These standards have been developed by practical farm problems. It is a disgrace to a modern educational institution and a great handicap to the student to graduate veterinarians who are not thoroughly trained in the practical application of their professional training to modern farm and livestock conditions.

Some veterinary colleges in times past have required students to put in at least one vacation with a successful practitioner as a preceptor. If a student has not had practical experience in the breeding and handling of livestock before he enters a veterinary college, this practical training should be insisted upon by the college authorities, no matter how good a student he may be, as determined by academic standards. The English veterinary colleges make their final examinations intensely practical. This is as it should be. A student's progress can be measured very accurately by his daily work during the course of study, but his ability to apply his training to everyday veterinary problems should be determined by the college that gives him the training before it recommends him to the public as fitted to practice his profession.

There are some educators who seem to think that if a student makes good grades in the usual college courses, he is fitted to practice. This does not necessarily follow. The college should afford the opportunity for real practice and be sure the student is really qualified before the final seal of approval is granted.

State examining boards should above all things emphasize the practical problems that the candidate will have to meet in that state. They should know that he can properly handle serious problems.

In our efforts to secure a higher veterinary training in the colleges, let us also insist that it shall be better by combining the theoretical with the latest and best in practice. N. S. M.

CANADA ACCEPTS CERTIFICATES OF ACCREDITED VETERINARIANS

THE Veterinary Director General of Canada has approved an arrangement whereby the mallein test certificates issued by veterinary practitioners of the United States who are "accredited" for testing accredited herds will be accepted in admitting horses, mules and asses from the United States into Canada when indorsed by a Bureau inspector. Under this recent modification of the Canadian requirements veterinary practitioners who are eligible to administer the tuberculin tests in accredited-herd work are also eligible to administer the mallein test for animals about to be exported to Canada. Previously the accredited practitioners of the United States had, under similar conditions, been approved by Canada for testing cattle entering that country.

There were approximately 300 practicing veterinarians in the United States registered by the Bureau of Animal Industry to apply the mallein test to animals for export to Canada. In view of this recent arrangement with the Canadian authorities that list was abolished May 1, 1922. Thus the privilege of administering the mallein test for horse stock destined to Canada has been extended from 300 veterinary practitioners to approximately 5,000. The action of the Bureau and States in requiring veterinary practitioners to pass an examination in order to entitle them to participate in the cooperative tuberculosis eradication work was no doubt responsible for the modification of the Canadian requirements in regard to both the tuberculin and mallein testing of imported animals from the United States.

This change will also be advantageous to exporters of horse stock. Shipments in many cases consist of a few horses and several cattle. Under the previous requirements an accredited veterinarian while testing cattle on a farm for shipment to Canada was not authorized to make the mallein test of a horse unless he chanced also to be registered with the Bureau for the latter purpose. The shipper would then have had to seek the

services of such a registered practitioner in addition, in order to have both his cattle and horses accompanied by proper certificates. Therefore, Canada's recognition of the accredited veterinarian for both these lines of work should prove very gratifying to practitioner and shipper alike.

INCREASED APPROPRIATIONS FOR THE B. A. I.

IN the Agricultural Department appropriation act for the year beginning July 1, 1922, which was signed by the President on May 11, there were several increases in various items for the Bureau of Animal Industry. The appropriation covering the eradication of bovine tuberculosis was increased over the regular appropriation of last year by \$898,800, all of this to go to the payment of indemnities for reacting animals slaughtered. The item of \$978,800 for operating expenses has been reduced to \$850,000. During this year the regular appropriation for indemnities was augmented by an emergency item of \$600,000 made available last December. The entire amount covering the tuberculosis eradication work amounts to \$2,877,600, of which \$300,000 is available for use at once in order to insure that there will be no break in the work in States where the funds for the current year have been expended.

In the item for animal husbandry investigations an increase of \$1,500 was provided to be used for the genetics project. An increasing accumulation of data along this line resulting from experimental work makes necessary a small additional sum to tabulate the figures and present the information in practical form. An increase of \$5,600 also is made in the item for investigations of animal diseases. This sum will be added to the allotment of the Zoological Division and will be devoted to a further study of the internal parasites of hogs. A reduction of \$5,000 is noted in the item for disease control, resulting from an added restriction that in the future blackleg vaccine may not be prepared and distributed by the Government.

PAPERS ON ANATOMY

A SERIES of short articles on anatomy by Dr. Septimus Sisson, Professor of Anatomy in the College of Veterinary Medicine of the Ohio State University, under the general title of

"Miscellanea Anatomica," begins in this issue of the JOURNAL. The first paper is intended as a sort of introduction, indicating the methods of modern anatomical study and instruction. It seems to be just dawning on the veterinary profession that anatomy has a very real and vital relationship to almost all of our professional activities. It is not unreasonable to say that within the last decade a most important revision of our anatomical ideas has taken place, just as it did in human anatomy a few years earlier. This should have a very decided influence on physical diagnosis and surgery in particular.

We are sure that these papers, written by a high authority in the field of veterinary anatomy, bringing together what the author terms "fragments" gathered in the past thirty years of his anatomical work, will not only prove interesting to our readers but will have the effect of directing to an important subject a larger measure of the attention that it deserves.



HEMORRHAGIC SEPTICEMIA¹

By C. J. MARSHALL

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HEMORRHAGIC SEPTICEMIA manifests itself in a variety of forms in mammals and birds. As examples might be mentioned pneumonia of horses, cattle and calves; swine plague, fowl cholera, and a form of the disease in different species of animals, which is decidedly acute and fatal with no autopsy findings that would account for death. It is probable that the hemorrhagic septicemia group of diseases is as old as anthrax, contagious pleuropneumonia of cattle and many other well-known diseases, yet the literature on the subject is confined to recent times. Bubonic plague or Black Death of the Middle Ages is a form of this disease in man.

An intelligent understanding of hemorrhagic septicemia began in 1878, when Rivolta and Semner discovered the *Bacillus avisepticus*. Their discovery was verified by Pasteur two years later. Bollinger described the symptoms of the disease in 1878 in cattle and deer and called it Wild und Rinderseuche. The cause of the disease described by Bollinger was discovered by Kitt in 1883. The memorable work of Smith and de Schweinitz in reference to swine plague was started in this country in 1886. Much valuable information has been collected since this pioneer work began less than fifty years ago.

This class of organisms with their many biological characteristics have been called the bipolar or pasteurella group and appear to be the causative factor of the hemorrhagic septicemia class of diseases, which may be of a toxemic or septicemic nature and lead to a prompt and fatal ending or may occur in a less virulent, edematous, pectoral or intestinal type. Death is so sudden in certain forms and the autopsy findings so scanty that death has frequently been ascribed to poison or accidental causes. This form is often seen in cattle at pasture on new or wild land.

Hemorrhagic septicemia has many names of a local nature.

¹ Presented at the regular meeting of the Conestoga Veterinary Club, Lancaster, Pa., January 12, 1922.

In Pennsylvania it has been called the Carbon County disease, for the reason that it was prevalent in that county for many years.

Cornstalk disease has caused much speculation and confusion. *Hoard's Dairyman*, under date of November 25, 1921, in answer to a question about cornstalk disease, stated that it is attributed either to acute indigestion or as a result of too much coarse, indigestible feed or some poisoning substance in cornstalks. Dr. Pearson described an outbreak which occurred in 1896 at Kirkwood, Lancaster County, Pennsylvania. It was later considered to have been hemorrhagic septicemia. In "The Pathology of Infectious Disease of Animals," by Moore, published in 1908, it is suggested that cornstalk disease is a mysterious affection of cattle, which is probably caused by an intoxication from eating an excessive quantity of one or more elements existing in cornstalks themselves. It is rather significant that the more we learn about hemorrhagic septicemia the less we hear about cornstalk disease.

The pectoral form of hemorrhagic septicemia is occasionally seen in a herd of acclimated cattle. Those that have been shipped are more susceptible to it. It is often called shipping fever of cattle or stockyards pneumonia. In many respects it is quite similar to shipping fever in horses. The disease varies considerably in virulence in both species from an insignificant ephemeral fever to a fatal case of pleuropneumonia.

The pectoral form in cattle has often been mistaken for contagious pleuropneumonia or lung plague. In the fall of 1892 the Federal Government declared this country free from contagious pleuropneumonia. The last known case was slaughtered in New Jersey in the spring of 1892. In 1891 the disease was suspected in some American cattle that had been shipped to France and offered for sale at the abattoir La Villette. The disease was so similar to contagious pleuropneumonia that a special investigation was made by Nocard. He presented a report of his findings in July of the same year at a meeting of the Central Veterinary Society in Paris and called the disease infectious bronchopneumonia of American cattle and concluded that it was a disease peculiar to America, and known in our Western States as cornstalk disease. Great Britain was considerably exercised over this disease, which they had observed

in American shipments from 1879 to 1891. Their scientific men differed in opinion. Some considered it contagious pleuropneumonia. As a result the embargo was held against American cattle.

Our older veterinarians who had been engaged in eradicating contagious pleuropneumonia from this country know well the similarity the contagious form bears to the pneumonic form of hemorrhagic septicemia. Contagious pleuropneumonia is one of the four principal animal plagues that led up to founding the first veterinary school. A great deal of work has been done on this disease, but the causative organism has never been found. We sometimes wonder if the disease would be promptly recognized if an outbreak should again occur in America. Pleuropneumonia is present in each disease, and on section the lungs show the peculiar marbled appearance. Law calls attention to the fact that a pneumonic bovine lung shows a marbled appearance whatever the cause may have been. It should be remembered that North America is considered free from contagious pleuropneumonia. The pneumonic form of hemorrhagic septicemia is common. Contagious pleuropneumonia spreads from herd to herd, while the hemorrhagic septicemic form is not so characterized. Contagious pleuropneumonia spreads slowly but surely through a herd.

The hemorrhagic septicemic form may attack a number of animals in a herd about the same time and the course is usually much shorter. The lung lesions in the contagious form are characterized by pneumonic areas of different ages. The laboratory can find the bipolar bacillus in hemorrhagic septicemia, yet it may be present in cases of contagious pleuropneumonia. Diagnostic inoculations and history should settle the question beyond dispute.

Aside from the hemorrhagic septicemic form, pneumonia is rather rare in cattle. They appear to be more resistant than horses to pneumonia.

The local veterinarian should be able to recognize the various forms of bipolar infection early and at the same time keep in mind the importance of a differential diagnosis. Diseases with which hemorrhagic septicemia may be confused are anthrax, blackleg, malignant edema, poisons, contagious pleuropneumonia,

rinderpest, malignant catarrhal fever and a subcutaneous tuberculin reaction.

In applying the tuberculin test to cattle in transit or to those that have been recently shipped, it should be remembered that certain cases may develop high temperatures from this infection about the time a reaction is due, and caution must be exercised to prevent mistaking it for a tuberculin reaction.

The treatment for hemorrhagic septicemia is usually unsatisfactory. Death occurs so quickly in the subacute forms that there is no time for medicine to assist in checking its progress. Isolation of the sick, segregation and change of food and water for the exposed are important measures. The disease is reportable under the laws of Pennsylvania, but should not be reported as contagious pleuropneumonia.

The pectoral form seems less malignant, and treatment should be undertaken promptly. There is no specific treatment for pneumonia of any form, yet good nursing and certain drugs judiciously used are of inestimable value.

The pneumonic form or shipping fever in cattle is amenable to treatment and should be handled along somewhat the same lines that have been so well established for treating influenza and pneumonia in horses.

There is a wide difference of opinion regarding the use of counter irritants. The writer is decidedly partial to a good mustard plaster in the early stages of pneumonia of any form in any species of animals. The action of mild laxatives in certain cases and heart stimulants for all are decidedly helpful.

Much work has been done in an effort to produce a biological product for preventing and treating the disease. Opinions vary regarding their value. They have been used energetically in an effort to control chicken cholera. Results have been disappointing. Their value in controlling calf pneumonia has not been established beyond a shadow of doubt. We are satisfied that preventive measures in the way of good stable hygiene are more effective. The Pennsylvania Bureau of Animal Industry began the use of bacteriological products in bovine hemorrhagic septicemia in 1902. Bacterins were used at first with unsatisfactory results. In 1914 Drs. J. B. Hardenbergh and Fred Boerner prepared a vaccine which was used extensively during the year 1915. Their work was reported in April, 1916, in the JOURNAL

OF THE AMERICAN VETERINARY MEDICAL ASSOCIATION. The vaccine has been used in Pennsylvania extensively since 1915. In herds or sections of the State where the disease has been known to recur frequently the vaccine is used annually, about as regularly as anthrax and blackleg vaccines. We believe that hemorrhagic septicemia vaccine is useful in preventing and treating the disease in cattle.

DISCUSSION

The subject was thoroughly discussed by Drs. Bernard, Bender, Brady, Chodos, Clark, Johnson, and others who have had many years' experience in handling stockyards pneumonia and other types of hemorrhagic septicemia in Lancaster County. The Lancaster Stock Yards is one of the largest distributing centers for feeding and dairy cattle in the State or in the East. Stockyards pneumonia from this source causes extensive losses each year in this section. The local veterinarians, and especially Dr. Joseph Johnson, have had an extensive experience in handling the disease. All spoke in the highest terms of the value of vaccines in controlling the disease.

DOCTOR HADWEN SAILS FOR ENGLAND

Dr. Seymour Hadwen, who has just completed an 18 months' study of reindeer in Alaska as chief veterinarian and parasitologist of the Biological Survey of the United States Department of Agriculture, sailed for England April 16 to continue his studies. Prior to his work in the Biological Survey, Doctor Hadwen was chief pathologist of the Canadian Department of Agriculture.

Doctor Hadwen and L. J. Palmer have been in Washington collaborating on a report which summarizes the results of their Alaskan studies. Mr. Palmer, who has just returned to Alaska, is in charge of grazing investigation in the Territory. It is hoped that their report may soon be available as a contribution of the Biological Survey to the department bulletin series.

Reindeer herds in Alaska are being encouraged both for their economic value as meat producers for the export trade and for their importance to the Eskimos for food and clothing. Many of the animals from which the Eskimo formerly obtained his food and clothing have been destroyed, and the future of the reindeer, as in any other important industry, depends upon wise supervision and management.

TREATMENT OF RETAINED PLACENTA IN COWS¹

By GEORGE W. GRIM

Princeton, New Jersey

IN PRESENTING a paper on the treatment and care of cows following retention of the fetal membrane it is my desire to call attention first to the great need of a deeper and more comprehensive study, within the profession, of this most difficult subject. Those who have searched the literature with a desire to find a "best method" which could be safely followed on the rank and file of cases that from time to time confront the practitioner have doubtlessly gone out the same door by which they entered. Those who have practiced perhaps the most generally used method of the day, in routine, that of manual removal, irrigation and the insertion of capsules of iodoform as recommended by Williams, surely can report a great variation in results, and for any of us to attempt to draw satisfactory or substantial conclusions from the scant morsels of information recorded in literature thus far, as a result of clinical observation, would be folly indeed.

It is not my intention to introduce any new method of procedure, but rather to report quite briefly the results obtained in treating 107 cases of retained placenta in a large herd of dairy cattle. During the two years prior to the commencement of the work reported in this paper approximately 316 fetal membranes were retained in cows of this herd. During the same period of time 148 abortions occurred. In most cases the membranes were allowed to putrefy and slough and finally to be discharged by the contractions of the uterus. In many instances weights were tied to the protruding portion of the membranes or the protruding portion was wound about a stick and torn away by direct traction. Very rarely was an animal treated by a veterinarian. One hundred and eighty-six of these cows were sold to the butcher during the first six months following parturition.

The results of this primitive practice upon grade dairy cattle were not as disastrous from the standpoint of loss of life as would

¹ Presented at the conference of veterinarians held at the School of Veterinary Medicine, University of Pennsylvania, February 28 and March 1, 1922.

be expected. The occurrence of septic metritis with peritonitis and death following retention of the membranes was rare indeed. This fact has long been known among cattle men, and were it not for the almost certain sterility that they have recently learned follows in the wake of such treatment, many probably would be satisfied to allow nature to take her course.

So it was that of the 316 cows in this herd which had retained the afterbirth during the two-year period under consideration approximately 130 remained in the herd at the time I was called upon to determine the cause of a prevailing and steadily increasing wave of sterility. A careful physical examination was made of the generative organs of all animals failing to conceive following repeated service. This examination revealed 77 cases of catarrhal metritis accompanied with sterility and 41 cases of sterility in which no evidence of catarrhal metritis could be detected, a total of 118 cases of sterility, all of which were held under treatment. It was not possible for me to identify all of the 118 cases with a corresponding number of the 130 cases before mentioned, but it is very fair to assume at least that within the 77 cases of catarrhal metritis rests a substantial majority of the 130 apparently recovered cases of retained afterbirth present in the herd when this work was started. Hence it appears at once that the amazingly high sterility rate in the herd at this time can be attributed directly to the absence of treatment of the uterus at the time of retention of the fetal membranes. It is also worthy of note at this time that of the 316 cases untreated during the two-year period only 7 terminated in death.

With these facts in mind, attention was naturally directed toward the cow at the time of parturition, and a careful watch was kept on all cows immediately following parturition to prevent any animal retaining any portion of the fetal membranes to be passed by unnoticed. Wherever possible the placenta was taken from the stall immediately following expulsion and examined to ascertain if any part had remained within the uterus. The placenta was next carefully examined for lesions of contagious abortion. I regard this examination highly important and can commend it as a valuable adjunct in the control of placentitis and the ravages of infectious abortion. Often, too often, is a badly diseased membrane regarded as normal

when no regular examination is made. The disease, unrecognized, is often unconsciously scattered about, and the discharges containing enormous quantities of infectious material menace all animals with which they come in contact. A good practice to follow in maternity barns is to collect all placenta in a galvanized iron can as soon as they are dropped and dispose of them by burning. These fetal envelopes that so often are diseased and passed by unnoticed give forth the seeds that propagate the infection in all susceptible individuals with which they come in contact. Cows that were found to pass placenta of a diseased character, cows that retained the after-birth and cows aborting were isolated until all discharges ceased. In this manner the opportunity of spreading infection was greatly reduced. If unable to find the placenta the day following parturition, the vulva is examined carefully by spreading the lips apart with the fingers. The appearance of an amber-colored translucent mucus convinces me that the placenta has passed completely and that no further complications are to be expected. In fact, I have never known a cow in which a translucent, amber-colored mucus appeared the day following parturition to have any further uterine disturbance.

In the conduct of this work all animals failing to expel the membranes within twelve hours were considered as suspicious of infection with contagious abortion and treated as such. These animals were immediately isolated and quarantined.

In all cases where the hand was introduced into the uterus the tail, anus, vulva and buttocks were thoroughly scrubbed with a 4 per cent solution of creolin. Immediately before the hand is introduced into the vagina the hand and the arm up to the shoulder are carefully scrubbed and the finger nails are clipped and cleaned. The hand is then carefully passed into the vulva above the protruding membrane, avoiding the latter as much as possible so that infection is not unnecessarily carried into the uterus through contact of the arm with the membrane. The arm is then passed on through the vagina and os uteri into the uterus, and as far back into the cavity as possible. The hand may then grasp the placenta within the uterus, and by slight tension on the membrane with the other hand outside, the extent and location of the adherent portion of the membrane may be quickly determined. By stripping the placenta from a few

of the cotyledons, the degree of adhesion may be ascertained and from this information a decision may be made as to the proper time to remove the membrane.

I do not want to pass on without again laying particular emphasis upon the importance of cleaning up the region about the vulva and cleaning the hands and arms, and of exercising care in entering the uterus, for it is my sincere conviction that upon these things will depend in a large measure the results attained. It has been repeatedly shown that where grave constitutional disturbances with metritis and peritonitis develop the infecting organism is quite frequently carried directly to the uterus from without and there it multiplies with great rapidity. Is it not then reasonable to infer that the hands and arms of the operator are one of the greatest dangers for the introduction of these microbes? Certainly it appears so when we stop to consider how rarely indeed death occurs following neglect to remove retained membranes.

The ideal to be sought for in the removal of the retained membranes by hand is to take them away at the earliest time when the separation of the chorionic adhesions to the maternal cotyledons may be made readily and completely and with the least disturbance to the patient. When this operation requires more than 40 minutes the patient often becomes uneasy, straining occasionally, and plainly showing evidence of fatigue. To insure the best results this must be avoided. In cases where spasmodic uterine contractions commence during prolonged cleaning I have found it best to stop work at once. This necessitates a second operation, usually the following day, to remove the membranes completely, and hence the danger of introducing infection from without is increased. I do, however, believe that when care in cleaning up is exercised the danger of introducing infection by entering the uterus a second time is of less consideration than the distress inflicted upon the patient by prolonged cleaning. Rarely are there observed any bad effects upon the patient during the first 30 minutes of operation. The hand and arm once inserted into the uterus are kept there, if possible, and are not withdrawn until the membrane is out or the operation is suspended until a later date. The object of keeping the hand in the uterine cavity until the membrane is completely released is to eliminate as far as possible opportunity of intro-

ducing infection from without by repeated passage of the hand and arm into and out of the uterus.

The completeness with which the membranes may be removed will depend in a large measure upon the extent of the lesions present. It has been pointed out that in abortion disease the Bang bacillus is present in great numbers in the epithelial cells covering the chorion. The chorionic epithelial cells in the area between the cotyledons are most frequently infected. The epithelial cells at the margin of the cotyledons and the outermost villi of the cotyledons themselves have been found to be densely invaded with bacilli. The bulk of the villi are comparatively free of the bacilli but have undergone profound changes.

What other tissues of the fetal membranes are attacked as the disease progresses is not known. But in a number of cases contained in this report the extent of cell necrosis was such that the chorion tore away from the margin of the maternal cotyledons around the chorionic tufts, even with the most careful handling, 36 hours following parturition.

In cases such as these complete removal is impossible. Investigation has shown that a very large percentage of retained afterbirth is associated with infectious abortion. No doubt other diseases of the membrane will be identified to account for placentitis not associated with Bang's bacillus. But the fact remains that the fetal placenta is the active seat of the disease until it is expelled from the uterus, and upon the extent and progress of infection will depend the alterations in the placenta and the condition we are called upon to treat. It is hence quite obvious that no definite time may be set following abortion or parturition when placenta may be removed if best results are to be obtained.

The methods of treatment studied during the course of this work were the following:

1. Manual removal third or fourth day.
2. Manual removal third or fourth day and lactic acid bacilli and dried milk powder introduced into the uterus.
3. Membranes not removed; lactic acid bacilli and dried milk powder introduced into the uterus.
4. Lactic acid milk in conjunction with mineral oil
5. Mineral oil and lactic acid bacilli.
6. Manual removal 24 hours following parturition.

The accompanying table summarizes the results obtained by these six methods of treatment.

SUMMARY OF RESULTS OF 107 CASES OF RETAINED PLACENTAE

Treatment	Number of cases	Recovered. No further treatment	Discharge persisted 3 months	Sterile from other causes	Average number of days required to clear up
Manual removal third or fourth day	29	21	5	3	12
Manual removal third or fourth day and lactic acid treatment.	23	6	4	13	8
Membrane not removed; lactic acid treatment	11	3	3	5	15
Lactic acid milk and mineral oil	2	0	2	0	.....
Lactic acid bacilli and mineral oil	16	6	7	3	10
Manual removal in 24 hours.....	26	22	4	0	7

Of the 29 cases removed by hand upon the third or fourth day, 21 required no further treatment after the twelfth day following parturition. Periodic examinations of the condition of the uterus were carried out in all cases until a positive diagnosis of pregnancy could be made. It will be noted that 8 of the 29 cases treated by this method resulted in sterility. In 5 of the 8 cases the sterility was apparently due to catarrhal metritis. The sterility in the other 3 cases was apparently of ovarian origin.

The normal course of a case terminating in recovery following this method of treatment is as follows:

Ayrshire cow, age 6 years. Aborted at first pregnancy. Carried calf full time at three succeeding pregnancies. Retained placenta at fourth parturition; calf normal.

First day—Placenta retained and protruding from vulva; grayish-yellow discharge.

Second day—Portion of membrane still protruding from vulva; condition of patient good.

Third day—Membrane still retained; condition of patient unchanged.

Fourth day—Placenta removed by hand. Abundant discharge; odor pronounced.

Fifth day—Some odor and watery, gray discharge noted.

Sixth day—Odor still persistent; discharge becoming dark and not so thin.

Eighth day—Discharge much reduced in quantity and becoming thick, sticky and brownish black.

Ninth day—Discharge and odor slight. Condition of patient good. Lactation good.

Eleventh day—No discharge or odor detected.

On the twenty-fourth day following parturition a vaginal examination was made and the cervix was found to be tightly contracted. A scant quantity of clear mucus was found to be present in the vagina. Rectal examination showed the uterus to be contracted down to normal and no abnormalities of the tubes or ovaries were detected. At the third oestral period following parturition the cow was bred. On examination ten weeks later the animal was found to be pregnant.

While fairly uniform and fairly satisfactory results were obtained by manual removal on the third or fourth day, difficulty was quite often encountered in getting the uterus to clean up to a sufficient extent to permit the cow to be placed in the milking herd on the eighth day following parturition. As it was desired to have a fresh cow fit for the production of milk when the seven-day period specified by the certified milk regulations expired, an effort was made to devise a method of treatment that would hasten recovery in these cases. With the view of inhibiting bacterial action in the uterus following manual removal of the membranes and thus hastening recovery, a half-teaspoonful of a pure culture of lactic acid bacilli grown in sterilized milk was placed in a gelatin capsule with two or three teaspoonfuls of dried milk powder. One of these capsules was inserted in the uterus after the removal of the membranes, and this was repeated every second day until the os closed. The capsules were also used without manual removal and also in conjunction with mineral oil, and in two cases lactic acid milk was used with mineral oil. The use of the lactic acid bacilli in these cases was based upon the lactic acid therapy advocated by Metchnikoff in the use of fermented milk drinks in the treatment of intestinal disturbances in man. Dried milk powder was added to the lactic acid culture so that the lactic acid bacilli would find a ready soil upon which to grow. Under favorable conditions the lactic acid bacillus grows very rapidly and produces acid. The growth of other bacteria is inhibited when the acidity reaches 0.2 per cent, but the lactic acid bacilli continue to grow until the acidity reaches 0.8 per cent. The benefit, there-

fore, to be derived from the use of these cultures depends upon their ability to produce acid in sufficient quantity to keep down the growth of other organisms. If this can be done successfully, the number of cases in which the discharge is prolonged beyond a week are materially reduced.

Twenty-three cases, as shown in the table, were treated by manual removal of the membranes during the third or fourth day and in addition a capsule containing lactic acid bacilli was inserted into the uterus. A capsule was placed in the uterus every other day as long as the cervical canal would permit of the introduction. In most of the cases the discharge ceased after the insertion of two or three capsules. When the discharge had considerable odor, both the odor and the discharge were promptly reduced. The number of cases treated by this method which afterwards required further treatment for sterility is disappointing. Further study of a larger number of cases treated by this method will be required to determine what part the lactic acid bacilli and powdered milk play, if any, in increasing the number of nonbreeders. Cases of chronic catarrhal metritis were quite rare following this treatment. In most of these cases the prevailing sterility was found to be associated with pathological conditions of the ovaries. Giltner and Hallman report the use of *Bacterium bulgaricus* in a large number of cases of purulent metritis, with favorable results. No mention of the subsequent occurrence of sterility is made.

The lactic acid capsules were used in most cases on cows in which the placentitis had become so extensive that the diseased chorion had separated from the fetal cotyledons at the outer margin, the chorionic tufts in many instances being so firmly adherent to the maternal cotyledons that it was impossible to free them. In such cases a discharge was quite frequently observed following manual removal of the membranes upon the third or fourth day which persisted in varying degrees for two or three weeks after parturition. The early use of lactic acid capsules in these cases promptly and efficiently controlled this discharge, and in many cases no discharge was observed after the eighth day following parturition.

The following typical case illustrates the effectiveness of the lactic acid bacilli in controlling the uterine discharges:

Large Holstein cow. Gave birth to normal full-time calf at first pregnancy.

Uterine examination on second day showed placenta firmly adherent. Considerable odor was present. Two capsules containing lactic acid bacilli and dried milk powder were inserted in the uterus.

Third day—Placenta still retained; odor pronounced. One capsule inserted.

Fourth day—Placenta still hanging from vagina. Removed by hand. Two capsules inserted. Thick grayish yellow discharge present; some odor.

Fifth day—Discharge greatly reduced in quantity; odor faint.

Seventh day—Discharge very scant and becoming thick, yellow and sticky; no odor; uterus contracted.

Eighth day—Tuft of hair on vulva clean. No discharge noted.

Tenth day—No odor or discharge present.

Subsequently this animal was bred three times and failed to conceive. On examination the uterus appeared normal in size. No evidence of endometritis. The right ovary was enlarged and a cyst was found upon its surface and ruptured. The animal was again bred and is now pregnant.

In order to determine to what extent lactic acid bacilli would control putrefaction and prevent the development of chronic catarrhal metritis, the retained membranes were permitted to remain in 11 cows, no effort being made to dislodge them. Capsules containing lactic acid bacilli and dried milk powder were introduced into the uterus every other day to check putrefaction. The results as shown in the table seem to indicate that while the incidence of chronic catarrhal metritis was not so high as in the cases untreated, the number of nonbreeders was certainly too high to justify the use of this method. The discharge also persisted for a longer time than with any of the other methods of treatment used.

In connection with the investigation of the action of lactic acid bacilli an effort was made to determine whether commercial lactic milk, as prepared for the market, could be successfully utilized in the control of discharges associated with retention of the fetal membranes. Ordinary commercial lactic acid milk with an acidity of 2 per cent was used. Both *Bacterium bulgaricus* and *Bacterium lactis acidii* were present in the milk. One quart was injected into the uterus of each of two cows into which mineral oil had previously been injected to free the retained membranes. The results, stated briefly in the table, are given in more detail below:

Two cows gave birth to normal calves; the fetal membranes were retained in each instance. Mineral oil was injected into the uterus of both cows upon the first day. In one case the

placenta was passed within 24 hours and in the other it was retained until the fourth day, when it was removed by hand. In this case the cotyledons in the gravid portion of the uterus were considerably swollen and the adhesions between them and the fetal tufts were very firm. A considerable quantity of fluid was present, some of which was removed by massage of the uterus. On the fifth day a quart of lactic acid milk was injected into the uterus of each cow. The following day the discharge was reduced in quantity, and the cervix in one case was so much contracted that considerable difficulty was experienced in passing a one-half inch catheter. In the other case some evidence of contraction was noted. Lactic acid milk was again injected into the uterus on the sixth day. On the seventh day the discharge was unchanged and both cows were straining. The mucous membrane at the entrance to the uterus was slightly rough and dry. On the eighth day both cows were straining badly and the appetite was poor. The discharge was diminished in quantity and the odor slight. Both of these cows continued to strain until the twelfth day, at which time one of them ceased to strain and showed signs of improvement. On the fourteenth day straining subsided in the other cow. Both animals were in poor condition by this time and were sold as unprofitable.

Along with the study of the action of the lactic acid bacilli with and without the manual removal of the fetal membranes, observations were also made on the effect of the injection of mineral oil the day following parturition in sixteen cases. From one-half to one and one-half quarts of mineral oil were introduced into the uterus by gravity in cases in which the membranes had not been passed twelve hours after parturition. In ten cases it was necessary to repeat the injection of the mineral oil the following day. Seven of these cases did not pass the membrane after repeated use of mineral oil, and it became necessary to remove the membrane by hand on the fourth day. Quite often putrefaction had advanced to such a degree by this time that lactic acid capsules were used to decrease the discharge and control the odor. The table shows the results following this treatment. I consider the number of cases in which the discharge persisted over two or three weeks too great to continue further application of this method. In some

instances a uterine examination made after the placenta had apparently been discharged revealed the presence of small portions of placental tissue still firmly adherent to the maternal cotyledons. These probably accounted for the persistence of the discharge.

Finally, 26 retained placentaë were removed by hand 24 to 36 hours following parturition. The finger nails, hands and arms were thoroughly scrubbed before entering the uterus. Great care was used in separating the placental adhesions to avoid leaving any portion of the membranes within the uterus. In almost every case from 30 to 45 minutes was required to remove the membranes completely. This work was very tedious. It was not possible to remove the retained membranes in every case within 24 to 36 hours following parturition, and in such cases they were allowed to remain until the third or fourth day. It was, however, possible to remove the membranes within 36 hours in 26 out of 35 cases in which the attempt was made. As shown in the table, the number of complete recoveries is quite encouraging. The average time required for these cases to clear up is also shorter than in any other method studied. Absolutely no after treatment was given any of these cases. They were left entirely alone and observations made upon the quantity of the discharge and the degree of odor. No disinfectants or solutions of any kind were used, except in four cases in which the discharge persisted. These were treated with Lugol's solution some time later.

It may be noted that in no place in this paper is any mention made of the use of uterine antiseptic douches following the removal of the placenta. Antiseptic douches were not used because of the opinion often expressed that antiseptics generally reduce the normal resisting power of the mucosa, and also because it would seem that the effect of antiseptic solutions can not be very pronounced in the dilutions in which they must be used in the uterus.

STERILITY OF CATTLE¹

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STERILITY may be defined as an absence of the normal generative functions, either in part or as a whole. It may be due to lack of development of the organs of reproduction, some part or parts of them, or to a suspension of their normal functions.

The class of cows in which sterility is due to a lack of development of the generative organs is usually observed when the cow has arrived at the age for her first conception. This class remains permanently sterile. A female born twin to a male usually belongs to this class, although we know of three females born in this manner in which the generative organs became normally developed and when they reached the age of sexual maturity were fertile.

The group of sterile cases in which the generative functions have once been normally active and then for some reason or other become suspended, may be divided into two sub-groups: (1) Temporarily sterile; (2) permanently sterile. Temporarily sterile cows may, by improper treatment or by lack of treatment, become permanently sterile. On the other hand, animals which in many cases without treatment would very likely become permanently sterile may with proper treatment be reduced to the temporarily sterile class.

Quite a number of the temporarily sterile group become nymphomaniacs as indicated by constant "bulling." They often show only false signs of estrum. On examination the ovaries are found cystic and there is generally a cervicitis. Nymphomaniac cases, after repeated treatments of the ovaries by massage and reduction of the cysts over a considerable period of time, eventually become quiet and either show no signs of

¹Presented at the thirty-ninth annual convention of the Pennsylvania State Veterinary Medical Association, Harrisburg, Pa., January 24 and 25, 1922.

estrum or show signs of normal estrum and if bred conceive. Some heifers become nymphomaniacs.

There are other cases that show no signs of estrum for long periods but in which upon careful examination nothing abnormal can be found, and still others in which a persistent corpus luteum and nothing else can be found, and in some of these the corpus luteum can not be dislodged.

For cases of the nature of those described above we have tried to bring on an estrum and establish the normal estral cycle by the administration of ovaries or ovarian extract, and with apparently good results. We tried the commercial ovarian extract on some cases and it did not seem to bring about the desired results. We then obtained some fresh ovaries from apparently healthy sows, chopped them into small pieces, and gave each case about two ovaries in a capsule by the mouth. This treatment seemed to accomplish the desired end. We then used a specially prepared sterile extract, giving each cow the sterile extract of one to two ovaries subcutaneously, with apparently as good results. The latter method is more convenient and insures against the transmission of disease.

This form of treatment has been given by us to nineteen cases of the nature of those described above, and every case, with the exception of one which is reported below, developed signs of estrum within thirty days. The following cases are representative:

Case No. 1 was born in 1913, gave birth to her last normal calf in 1918; aborted in 1919; was bred to be due March 21, 1920; examined March 17, 1920, and found not pregnant; examined June 10, 1920, and uterus found hanging well over the brim of the pelvis; examined July 7, 1920, and uterus appeared normal; examined July 1, 1920, and found corpus luteum in right ovary which could not be pressed out; examined August 14, 1920, and could not pass a small catheter; examined December 16, 1920, and could not pass catheter; given two chopped ovaries by mouth December 16, 1920; showed signs of estrum on December 18, 1920, which was the first observed estrum since June, 1919. December 28, 1920, she was examined, the catheter was passed, and the uterus was washed out; the return flow was clean. Everything appeared normal. In 21 days (January 8, 1921) the cow appeared in estrum and was bred;

examined March 12, 1921; not pregnant; examined June 3, 1921, and showed slight vaginitis. There had been no signs of estrum since January 8, 1921. The cow has not been examined since June 3, 1921.

Case No. 2 has not shown signs of estrum for 16 months; left ovary large and hard; nothing else abnormal could be found; had been treated with no favorable results; given two chopped ovaries in capsule by mouth; estrum appeared in 18 days; estrum again in 21 days; cow was bred and returned to the herd. The owner, not knowing that she had been bred, kept her in the herd for three months, during which time she showed no signs of estrum, and thinking she was in the same condition, sent her to the butcher. There was no autopsy. The cow may have been pregnant.

Case No. 3 was treated several times for a period of 12 months after freshening, then did not show signs of estrum for a period of four months. At the end of this period she was given chopped ovaries by the mouth; in 20 days showed signs of estrum, was bred, conceived to the first service and calved normally.

Case No. 4 was examined six months after freshening and nothing abnormal could be found; had shown no signs of estrum during period; was given two chopped ovaries by the mouth. Estrum appeared in 18 days. The cow was bred, conceived to first service and calved normally.

Case No. 5 was born October 10, 1910; gave birth to a normal calf in 1913 and another in 1914; aborted in 1915; calved normally in 1916, 1917, and November 11, 1918, which was her last calf; bred May 23, 1919; June 20, 1919; July 10, 1919; August 2, 1919; August 30, 1919; September 26, 1919; October 6, 1919; November 10, 1919; January 8, 1920; January 30, 1920; March 11, 1920; March 31, 1920; April 19, 1920; May 9, 1920; May 28, 1920; June 18, 1920; July 10, 1920; July 30, 1920; August 21, 1920; September 10, 1920; October 4, 1920; November 19, 1920; January 30, 1921; March 16, 1921; then showed no signs of estrum. May 26, 1921, given ovarian extract subcutaneously; showed signs of estrum June 26, 1921, and bred; showed no more signs of estrum; nothing abnormal could be found at any time; died of impaction during fall of 1921.

Case No. 6 was born December 22, 1915; calved in 1918 and again November 12, 1919, which was her last calf; bred April

8 and June 7, 1920; showed no more signs of estrum and thought to be carrying a calf until January 30, 1921, when she was examined and found not with calf. On this date a corpus luteum was dislodged from one of the ovaries. She showed signs of estrum February 2, 1921; was bred; showed no more signs of estrum and was thought pregnant until examination revealed that she was not. May 26, 1921, was given ovarian extract subcutaneously; estrum appeared June 27, 1921, and the cow was bred. Estrum July 17, 1921, and bred again; no more signs of estrum; examined October 20, 1921; not in calf and nothing abnormal could be found; examined November 22, 1921, and appeared normal; given extract of two ovaries subcutaneously November 22, 1921; December 5, 1921, estrum, and bred, then no more signs of estrum; examined January 16, 1922, and was thought to be pregnant.

Case No. 7 was born December 15, 1913; calved 1916, 1918 and last May 7, 1919; bred August 30 and November 12, 1919, then showed no more signs of estrum until July 28, 1920, when she was bred. After this date she became nymphomaniac. She was turned in pasture with a bull during the summer of 1921; would not allow the bull to serve other cows and would not stand for service herself. August 27, 1921, was given extract equivalent to two ovaries subcutaneously, after which she quieted considerably but showed no signs of normal estrum. One or the other ovary had been hard and cystic during all this time; the cysts were hard to break down and often could not be broken down. November 22, 1921, given extract of two ovaries subcutaneously; developed no signs of estrum but has been quiet. Examined January 16, 1922; one ovary apparently normal, the other large and contained cysts which were very easily ruptured; given extract one ovary subcutaneously.

Case No. 8 gave birth to her last calf July 30, 1919; became a very bad nymphomaniac in about six months after calving; treated periodically by massage of ovaries; bred May 5, 1920, and July 28, 1921; quieted considerably after last service and not treated since then. December 12, 1921, was given extract of two ovaries subcutaneously and the next day showed signs of estrum; was not bred and has shown no true signs of estrum since. January 1, 1922, showed false signs of estrum—about half estrum.

Case No. 9 gave birth to her last calf October 28, 1918. She showed no signs of estrum until June 27, 1919, when she was bred; then she became nymphomaniac and was bred repeatedly until a service of November 4, 1920, after which she no longer showed signs of estrum. The ovaries were treated regularly until that date. December 12, 1921, she was given the extract of one ovary subcutaneously; showed signs of estrum and was bred on December 23, 1921, and again January 12, 1922.

Case No. 10 gave birth to her last calf on July 9, 1919, and became nymphomaniac very soon after calving; was treated periodically by massage of ovaries; was bred September 10, 1920, then became quiet and showed no more signs of estrum. December 12, 1921, she was given subcutaneously ovarian extract equivalent to that of one ovary; showed signs of estrum and was bred January 6, 1922.

UNILATERAL SALPINGITIS

Case No. 11 had not given birth to a calf for a period of more than one year; showed false signs of estrum but would not stand for service; examined May 16, 1921, and everything appeared normal, except the right ovary and Fallopian tube, which appeared enlarged. On the same date an operation was performed through the right flank. The right ovary, which was enlarged to the size of a walnut, and the right Fallopian tube, which was about twice the size of a lead pencil, were removed. The uterus appeared normal. The left ovary was small. Upon examination after removal the right tube showed hydrosalpingitis. The right ovary contained, besides several small cysts, a deeply seated corpus luteum measuring five-eighths by seven-eighths inch in diameter and was surrounded by a ring of rather firm fibrous tissue. In one month the cow showed signs of normal estrum and was bred and is over seven months pregnant at the present time.

The French National Students' Union in its tenth congress at the University of Montpellier adopted a resolution urging that the government veterinary schools create and confer the degree of doctor in veterinary medicine to conform to the doctor's degree given in other countries. At present French veterinary graduates are not given the degree of doctor.

EXPERIENCE IN PRACTICE WITH UDDER TROUBLES ¹

By JOHN P. TURNER
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AN EXPERT on sanitary milk production once remarked that as long as a cow's udder was located so closely to her main excretory parts, the production of such milk would always entail considerable labor. Likewise, since the peculiar construction of a cow's udder permits of such marked changes when reacting to irritants, mostly bacterial, the successful treatment of mastitis seems to be a problem yet unsolved.

The inflammation occurring in the parenchyma causes the milk ducts and acini to become clogged with an exudate which we are powerless to remove to any great extent and almost as powerless to reach the affected part with any medicinal agencies. When we further consider that a powerful, very slightly yielding capsule covers the udder, and how this quality prevents, to a great extent, the proper circulation of blood and lymph in an udder reacting to irritants, it is readily seen how easily such tissues are destroyed and how little hope there is for recovery in many cases of mastitis. When its anatomical formation is noted, considering also the fact that most of our inflammatory conditions arise at or just after parturition, when the udder is enormously enlarged and extremely active, it is readily seen that such a gland offers a fertile field for bacterial infection.

We know that the normal udder contains an abundant bacterial flora, and that they may assume a pathogenic character under direct irritation. With the progress of knowledge, and especially of bacteriology, it is generally conceded that bacteria play the all-important cause in mastitis. Many years ago it was thought that heavy protein feeding, especially with very narrow rations mostly made up of corn meal and cottonseed meal, caused mastitis. Then the cold cement floor, exposure and other such causes were brought forward. It is known that these may be contributory causes by lessening the animal's resistance; especially is it known that cold causes a lowering in

¹ Presented at the Conference of Veterinarians held at the School of Veterinary Medicine, University of Pennsylvania, February 28 and March 1, 1922.

the resistant qualities of tissues; hence a cold, wet cement floor is an accessory cause.

The infection causing mastitis comes most frequently through the opening in the teat duct, and infection is more frequent in the posterior quarters of the udder; hence the danger of permitting a rotting placenta to remain swinging to a cow, when it can be clipped off near the vulva and by vaginal washes kept from putrefying.

Again, a solution of continuity of the tissues of the gland proper is a common cause of infection, as is also injury to the teats. Thirdly, a group of infections reach the udder from other parts of the body. Such infections as tuberculosis, pyemia, streptococcus and staphylococcus are thus accounted for. Mastitis from indigestion is due to an autointoxication from fermented feeds. Occasionally cases of mastitis are directly traceable to septic conditions of the uterus, the writer having such a case under treatment at present. It is needless to say that any attempted treatment of this type of cases must first consist of cleaning up the uterine infection. In this specific case the mastitis commenced several days prior to parturition. When closely studied, mastitis is very much like wound infection.

Other conditions which can be more or less likened to it are bronchitis and bronchopneumonia, only in these conditions it is possible to assist nature in eliminating the plugging up of the alveoli and bronchials by the action of cough.

This line of comparison may also lead to consideration of the general treatment of mastitis, where we probably have as much right to hope for more success in the future treatment of this disease than merely depending on local medication.

The recent high and more or less artificial development of the milk cow, for the purpose of making an altogether unnatural high butterfat record, during the period closely following parturition, has produced a condition familiar to all practicing in dairy districts, that of a tremendous edema of the udder, which is so closely allied to a pathological condition that some have called it a physiological congestion. This purely physiological condition usually resolves very promptly in a few days if the cow is given a slight amount of exercise, is placed in a roomy box stall with plenty of water available and is fed a proper

cooling laxative diet, such as bran, beet pulp and a small amount of linseed meal.

When we read the wonderful cures of this and that medical preparation, or hear some veterinarian extolling his success in curing mastitis, we are prone to smile and think of our own early days in practice when we could readily establish a reputation for working wonders with a purely physiological condition.

But the experienced owner of high producers does not labor under any such delusions. When his cow develops "garget," as he calls it, he is neither interested in the fact that it may be catarrhal or parenchymatous or even gangrenous, but his first solicitude is as to whether or not you can cure his specific case. It takes all the strategy possessed by an experienced practitioner to handle the owner in these cases, and it is good practice to keep your line of retreat wide open before going into action.

Mastitis is a disease which can not be treated successfully while one is attired in a silk shirt and linen trousers. The writer dons rubber apron and boots and starts the treatment and gives the owner an example of what is expected of him. Most of us are apt to begin our treatment with a saline purgative combined with aloin. While many authorities say the action of salines is too slow, just try it with a quart of hot, strong coffee. Coffee certainly hastens the action of salines. Arecolin in one-half grain to one grain doses hypodermically is recommended by many and condemned by others. Eserin one-half grain and pilocarpin one to two grains are probably better. Eserin can be repeated if given in the smaller dose until a decided action is obtained. It is believed that these rapidly acting cathartics are very valuable in acute cases.

The writer is a strong believer in hot fomentations to the udder, which is first stripped thoroughly into a bucket containing plenty of lysol, sheep dip, or any such disinfectant, and such bucket should be constantly in use in these cases. A beet-pulp bag opened out by ripping and then both ends cut and two ends tied together over the loins and the other two ends passed between the hind legs and up on each side of the tail and carried forward, being attached to the ends tied over the loins, is then applied. Holes are cut for the teats to protrude through the sack, and then woolen cloths, preferably strips from a discarded horse blanket, are applied closely to the udder, in-

side of the suspensory sack and very warm water applied for at least two hours. When this is done, wipe the udder dry and massage thoroughly with iodized oil and apply a dry sack with some cotton batting around the udder. Repeat this treatment two or three times in the first 15 hours. Before retiring for the night, apply hot antiphlogistine or anti-itis thickly over the inflamed area, cover with cotton and a dry sack, and in the morning begin again with the hot fomentations, massaging with oil and warm, dry coverings, if the inflammation has not subsided. We bring the hot water to the stable in 10-gallon milk cans, and in this way the water can be kept very warm. Two cans are kept on the kitchen stove or over the dairy heater during the entire process.

Some authorities claim that the udder should be kept at an absolute rest, and attempt such treatments as belladonna applied locally to diminish secretions. We think its action very doubtful.

The action of heat is well understood, and our massage treatment is entirely directed toward exciting increased vascularity with its well-known sequela of increased leucocytosis; hence the matter of the substance used is immaterial, just so it is easily applied. The old well-known turpentine and lard combination has its advocates, but we sometimes get a little too much counter-irritation, hence our use of ordinary cheap petrolatum oil to which has been added a small amount of tincture of iodine.

We always endeavor to get all cases of mastitis in quarantine. Put them in a box stall in the horse stable, or build a box stall in a wagon shed—any place to get them away from the herd, as we know too well the danger of promiscuous milking of mastitis cases in the dairy barns, when floors and gutters become infected and too frequently the infection becomes general in the herd. It is a good practice to disinfect the stall from which a case of mastitis has been removed; the gutter is also disinfected, a practice which should frequently obtain on all well-managed dairy farms.

As to injecting disinfecting solutions into the milk cisterns through the teat, we discontinued such a practice several years ago, in spite of its many advocates. Inasmuch as the disease is far removed from where the disinfectant can reach, it seemed futile to continue such treatment. It may possibly aid some cases of catarrhal mastitis where the exudate becomes so thick

that it is difficult to remove through the teats, but in such cases we would use normal salt solution merely for its mechanical aid in diluting and somewhat breaking down any thickened collection in the sinus. We would not use boric acid solution, as it tends to coagulate both albumen and casein.

All milk stripped from mastitis cases must be destroyed by disinfection and burial.

While we are not yet sure of our position, yet it seems logical to treat these cases by some general treatment. Potassium nitrate has been used from time immemorial on account of its eliminatory action. Urotropin or its cheaper substitute, hexamethylenetetramin, liberates formalin and in this manner disinfects the udder during its elimination.

Dr. J. N. Frost of Cornell University recommends formalin very highly in the treatment of mastitis. He quotes Dr. Louis A. Klein that boric acid given by the mouth appears in the milk in 12 hours. Urotropin appears as formalin in the milk in 24 hours. Dr. Frost has given 6 drams of formalin twice daily in oil for two weeks and failed to see that it produced any ill effects on the cow's general health, either by loss of appetite, constipation or impaction. He has given 11½ ounces at a dose without ill effect. Given in oil, we get the laxative effect, which is beneficial. When 6 drams of formalin was given 3 hours after water and 7 hours after milking, it was found in the milk two hours afterwards, and continued to be present for 48 hours, the largest amount from the eighteenth to the thirtieth hour.

Frost supplements formalin treatment with purgatives and diuretics, as they increase the interchange of blood in the udder and hasten the elimination of waste products from the body. The first day one-half ounce of formalin is given in oil, then one dram three times a day, alternating with one ounce of turpentine, all given in oil. Eight days after this treatment no streptococci were found in the milk in a case of mastitis that had thick milk for two weeks and showed pure cultures of streptococcus. We are now using this line of treatment and believe that it is beneficial in many cases.

It has been our experience that severe cases of catarrhal mastitis usually terminate with closure of the milk duct and atrophy of the quarter affected.

We formerly passed up cases of gangrenous mastitis, as they

were usually found decubitus and in a very critical condition. A few years ago, while investigating a typhoid epidemic with a physician, we were hailed by a dairyman and asked to look at a cow that was down and had "garget," as he expressed it—a typical case of gangrenous mastitis, with patient either unable to rise or would not (a cow has a peculiar psychology of her own in this respect). As she looked "in extremis," we passed it up as usual. After getting into the conveyance, I asked this physician how they would handle such a case in human practice. He replied that either amputation would be tried or deep incisions for drainage to assist nature in a process of enucleation. On our return a few bold incisions were made deeply into the mammary gland and a stimulant of 1 grain of strychnia sulphate was given hypodermically. In those days one grain of strychnia sulphate hypodermically was the usual dose for cows. We have now changed it to $\frac{1}{2}$ grain after having a few convulsions. A few doses of stimulant were left with the owner, and much to our surprise the cow got to her feet the next day and later was turned into beef.

A very recent case of gangrenous mastitis involving the left posterior quarter of the udder was deeply incised, and nature made the most perfect job of enucleation we have ever observed. We had always considered the udder an organ of two parts, anatomically, but in this case nature made a perfect dissection of one quarter. The only error she made was in not sloughing off the blood vessels, which protruded as long finger-like cords, which we eventually had to pull down as far as possible, ligate and excise. This cow milked regularly through the other three quarters of her udder during this period of enucleation. Recently we used camphor in oil subcutaneously in these cases as a stimulant.

Those cases of subacute mastitis involving the entire udder, where bloody milk is the principal symptom, have not as a rule yielded favorably to treatment. In these cases we apply cold applications, using a solution of alum.

Localized mastitis with abscess formation is promptly evacuated into a pus pan or bucket containing disinfectant. The cavity is swabbed out with dry cotton, and iodine is later applied to the entire cavity, which is plugged with gauze into which we have worked as much bismuth formic iodide as is

possible. This powder is odorless and used in lieu of iodoform, which is banned on all dairy farms. We plug these cavities to prevent teat or stable infection with pus.

We do not use bacterins in treating mastitis, owing to the multiplicity of organisms found in the average case. Where mastitis has a tendency to involve other animals we would endeavor to have a bacterin prepared from the typical cases on hand.

Since we can cure only a small percentage of mastitis cases (25 to 35 per cent), and its treatment is always uncertain, laborious and frequently unsatisfactory, why not try prevention? Provide clean and well-littered maternity stalls. Give the cows on the milking lines plenty of space to prevent treading on each others' teats and bruising udders. Cut off, near the rectum, all retained placentæ, and keep them from becoming putrid by vaginal washing with normal salt solution. Drain and fill in all filthy barnyards and insanitary water holes to prevent teat infection. Recover and destroy all pus in stables. Make a practice of flushing gutters. Prevent sore teats from further infection by eliminating the sucking calf, and then protect the teat wounds. Where these wounds are so sore as to make milking difficult through attending pain, we wipe the sores with 4 per cent novocain (procain) solution prior to milking. By the time the other three teats, as the case may be, are milked, the sores will be anesthetized and milking can proceed with comfort to the cow and no danger to the attendant. Such a procedure also tends to prevent cows, especially heifers, from becoming confirmed kickers. When teats are sore but still able to be handled, we often dissect off the hard fissure and either apply phenol or touch them with nitrate of silver, to produce a firm protective scab.

A few years ago our dealer's barns were infected with a disease somewhat resembling cowpox, but the characteristic bluish ulcers of the latter were not present, nor were any febrile symptoms noted. The disease was more of a vesicular type of the teats and around the base of the teats. The disease readily answered treatment consisting of a local application of glycerin, tincture of iodine and tincture of benzoin compound in equal parts. In some cases we use glycerin and zinc ointment. With the advent of cement floors and improved stable fittings

and sanitation, this disease seems to have disappeared in our practice.

Infectious mastitis.—We have never seen a true outbreak of this form of mastitis, but were called in consultation to a large dairy farm in Pennsylvania, where a disease very similar to it existed. A mechanical milker was in use and probably had considerable to do with the outbreak, due to imperfect cleaning of its parts.

Enzootic mastitis.—This form has occurred very frequently in our practice during the past 30 years and has been observed twice on one dairy farm. The infection was probably a streptococcus infection, as it was very virulent. On the farm where the disease was twice observed several cows died of the infection, the result of secondary invaders. About one-half of the cows were ruined as dairy cows by the first infection, and the herd was practically ruined by the second infection, which occurred three or four years subsequent to the first outbreak.

We were called as consultant both times and advised isolation, quarantine and a general cleaning and reconstruction of the barn. The barn was finally put in sanitary condition by concreting floors and gutters and putting in modern stanchions and plenty of sunlight. The disease has not reappeared.

The methods on this farm were very primitive, and in both outbreaks mastitis cases were never isolated and the same milkers milked sound and unsound udders.

If we can impress you with the absolute necessity of quarantining all mastitis cases, we will be rewarded for our time. An old shed, the horse stable, a tool house—any place where a cow can be snugly kept for a week or two. Milk her after all other dairy work is done, and then wash the hands with soap and water and some bichloride of mercury solution. Milk this cow into a bucket containing disinfectant and bury the milk.

One of the most frequent conditions we are called upon to treat is partial or total closure of the opening of the milk canal, caused by local inflammation of the end of the teat, due either to hand infection (pinching, sharp finger nails, etc.) or to extension of inflammation from some vesicular or pustular condition of the teat or in other cases to treading on the end of the teat.

In heifers we occasionally see imperforate teats in all four quarters. These cases are treated by using a small cannula and

trocar to open the milk duct, followed by the judicious use of a teat plug.

In mild recent cases of partial closure, due to inflammation, we can relieve the condition by immersing the teats in very warm water for a few minutes prior to milking, causing a relaxation of the circular muscle fibers at the end of the teat. When milking is finished the teat is immersed in iodized oil. When such treatment fails it is necessary either to slit the end of the teat or to ream out the so-called "spider" with a Hug reamer. The latter procedure is usually adopted on farms quite a distance from our office and where any pretense to cleanliness obtains. On the old-fashioned "cow dung" farm we do not attempt teat surgery. The success of any teat operation depends on whether or not a fair degree of cleanliness obtains in the barn, and whether or not the herdsman can be properly drilled into following directions.

Our technique is as follows:

Milk all of the sound udders first, and then the three sound teats of the cow to be treated. Wash the udder and teats thoroughly with white soap and warm water. Dry. Apply tincture of iodine to the end of the teat.

Secure the cow's hocks with a strap, or chain hock hobbles, and then have an attendant pinch the nose. Then we wash our hands and introduce the Hug teat reamer, which has been previously kept in a bottle of alcohol and dipped in petrolatum just prior to using. Insert the Hug reamer, going only a short distance from the end of the teat, then open and pull out of the teat; one or possibly two cuts are necessary to open the end of the teat sufficiently wide for easily milking. The teat is now held for two or three minutes in a teacup containing 1-1,000 bichloride of mercury solution. Then we wipe the teat with gasoline to remove all skin fats, and apply a few rolls of electrician's tape around the teat, possibly two thicknesses, and insert a piece of tape which has been doubled on itself and a good-sized hole cut out of it near its end. This piece should protrude almost to the end of the teat. Two or three more rolls of tape are made over this to secure it in place, and then a metal self-retaining loop-end teat plug is inserted into the teat, after it has been immersed in both alcohol and oil. A piece of tape is tied to the plug, and this is tied by a bow-knot to the

extending piece of tape. The cow's tail is loosely secured to a surcingle, or rope, to one side of the animal, and the hock hoppers are removed.

The herdsman is advised to milk this cow last and after securing her hocks to wash his hands. A small wide-necked bottle of medicated alcohol and another bottle of petrolatum oil and two or three quarts of 1-1,000 bichloride of mercury solution are left for treating. If the teat is dirty, it is washed with warm water and soap. If not, it is soaked in a small cup of bichloride of mercury solution prior to removing the teat plug. The latter is removed and placed in the alcohol bottle by simply handling it by the tape. The teat is now milked and the end is soaked in a bichloride of mercury solution and the teat plug replaced after immersing it in the oil.

The cow's hocks are to be tied prior to any dressing, otherwise the plug is apt to be kicked out of the herdsman's hands and become infected. He is always advised to follow the procedure heretofore described. If the plug falls or becomes infected, it must be washed with hot water and alkali powder and disinfected with alcohol and immersed in oil prior to replacing.

This plug can be used for a week and then removed and the end of the teat dressed twice daily with zinc ointment.

The same treatment is followed where obstructions exist further toward the base of the teat, but the prognosis becomes more unfavorable as the lesion more nearly approaches the base of the teat.

We have never used the teat cannula described by Dr. Charles B. Conger, Richland, Mich., in *Veterinary Medicine* for April, 1921. We believe one must be within easy distance of the case if it is to be used successfully.

Fibrous obstructions of the teat duct.—Wherever possible we employ the Hug reamer and use the teat plug as heretofore described. However, there are cases of obstruction near the base of the teat which will not respond to this treatment.

Merillat (*Veterinary Journal*, May, 1916) states that Dr. A. M. Wray regularly operated on such fibrous growths by opening the teats over the obstruction; he only feared those obstructions with a fibrous band high up in the galactoforus sinus. He simply used surgical cleanliness and did not suture

the wound. The teat was carefully catheterized daily and the wound wiped and tincture of iodine.

Merillat cites three operations of his own, where nodules were in the teats. One was three-quarters of an inch from the teat orifice and the two others near the base of the teat. The animals were cast and stretched, the udder and teat cleaned and painted with tincture of iodine. A 4 per cent solution of cocaine was injected over the seat of the incision. Cut into the teat with one stroke, and the fibrous growth is snipped off with Mayo scissors. An Esmarch tourniquet was kept on the teat for 2 hours and then released. Teat was dusted with iodoform and treated as an open wound. The cases were personally catheterized daily by a veterinarian and the wound treated with tincture of iodine and iodoform. Leakage ceased after ten days.

Dr. Moore (*American Journal of Veterinary Medicine*, February, 1917) treats fresh wounds involving the milk sinus by using a self-retaining milk tube having an opening in the tube just above the retaining bulb. This drains milk which gathers toward the end of the teat. The tube is left in place and removed twice daily and boiled 10 minutes. He dresses the wound with iodoform and collodion and bandages.

In teat fistulas he cuts out a triangular piece above and below the fistula and scarifies it slightly; does not suture the wound, depending on the cicatrizing of the two new wounds to close the fistula.

In stenosis of the teats he casts the cow and slowly inserts a sterile dilator and massages the teat so as to dilate the canal and stretch the tissues without rupturing them. He claims this cures a hard milker.

When the opening in the end of the teat is too small he uses local anesthesia and slowly introduces a tapering sound into the teat canal. This sound may be from five-sixteenths to three-eighths inch at its widest.

In bands at the base of the teat, which prevent the milk from entering the teat from the sinus, Moore pushes a teat slit through the obstruction and makes the slit as large as possible. Failing in this, he cuts down through the teat and dissects out the fibrous band. In new growths obstructing the canal, he cuts down and removes the growths. Lactic acid calculi are

removed by using the dilator and pushing out with finger and thumb.

Traumatisms of teats involving the milk duct are very frequent in our work. When the wound is but a few hours old it is often possible to suture it and get primary healing. The cow is to be cast and the udder and teats thoroughly cleaned and packed around with clean newspapers or towels during the operation.

I have not been able to get primary union by simply bandaging the teat, as has been described by some writers in recent magazine articles, but these refer to surgical wounds in which the edges can be approximated without suturing.

More frequently than otherwise, the suturing of these teat wounds is attended with a lacteal fistula due to the fact that the teats seem to have some erectile-like power in their musculature, and when the milking process begins the milk suddenly gushes out of the wound as soon as the milker attempts milking the other teats. Our practice is to introduce a milk tube into the teat before touching the sound teats. The tube is immersed first in alcohol and later in petrolatum oil, it being understood that the end of the teat is to be clean and dipped in bichloride of mercury solution prior to introducing the tube. Sometimes this will prevent this gushing of milk through the sutures. As we have remarked before, the healing of these fresh wounds is very uncertain, and more often than usual a fistula results and is to be operated upon when the animal is dry. Always dry the animal if possible from six weeks to two months prior to parturition, in order to get sufficient time for the healing of the new wound.

We use collodium to cover the wound when the sutures are removed.

Supernumerary teats are to be removed from all purebred cows. It is far better to do this when they are young heifers, by stretching the small teat, snipping off with a pair of scissors, and touching the wound with either a piece of nitrate of silver or with the thermo-cautery, or we frequently use a small poker heated in the kitchen stove. Occasionally we snip off the small teat and suture the skin with two or three stitches. If not done until they are grown, the operation should not be attempted if the udder is already beginning to fill. It is recommended that

at least a month should intervene between this operation and freshening.

The same rules are to be observed where small teats are attached to the other teats near their base and are to be removed. Cast and stretch the animal, iodine the teat, stretch the attached teat, and by holding it with the hand snip off with sharp scissors, making the skin wound as small as possible, and touch with a small needle of the thermo-cautery. It is advisable to put a rubber band around the base of the large teat to control the small hemorrhage during the operation. Cut the band in one hour.

Twin teats can be separated if the joining membrane is thin, otherwise it is best to leave them alone.

In any of these teats or udder operations it is essential to have very dry and clean bedding. We frequently cover the straw bedding with plenty of clean newspapers; these can be changed frequently. The tail is to be tied loosely to the side until the patient is well.

Milk cysts following catarrhal mastitis are seen occasionally and are usually left alone. It is preferable to permit the quarter to atrophy than to try any meddlesome surgery. Where a quarter of the udder contains milk and a teat is entirely occluded, atrophy of the quarter generally occurs, if meddlesome, bad surgery does not cause infection.

Warts, both diffuse and pendulous, are very common in our practice. Snipping off pendulous warts and a careful touching of the wound with trichloroacetic acid applied with a little cotton on the end of a match usually produces permanent results. The surrounding skin is protected with vaseline.

Diffuse flat warts yield quite readily to applications of salicylic acid and castor oil.

Milk fistulas of the teat are not treated until the cow is entirely dry. We then cast the animal, using the English hobbles, stretch the cow, fastening the hind legs to one post and the fore legs to another. If the cow is horned, we bandage the horns with crimped stiff paper prior to casting. A small amount of 4 per cent novocain (procain) is injected around the fistula after the teat has been thoroughly cleaned and the area iodined. A small syringe used in dog practice, with a small needle, is best in these cases. A milk tube is introduced and the fistulous

opening entirely dissected out with a pair of sharp-pointed scissors. Hemorrhage is controlled, iodine applied, and the wound sutured with fine worm silk, using a small curved needle. If we feel fairly sure of our technique, we apply collodium; if not, a little iodoform ointment, and bandage with 1-inch gauze bandage, smearing tar over the latter. Remove stitches in five to seven days.

Some of the small fistulas of the teat will respond to the application of a caustic or by touching them with the small needle of the thermo-cautery, but this type of treatment is not radical and is not done unless the dairy farm is available. Most of our calls are at quite a distance, and the radical operation must be done on the first visit, as the expense frequently precludes a second visit.

In response to an invitation, Dr. B. H. Ransom, Chief of the Zoological Division of the Bureau of Animal Industry, read a paper before the American Medical Association at the meeting to be held in St. Louis, May 22 to 26. His subject will be, "Recent Additions to the Knowledge of Ascariasis."

At the annual meeting of the American Society of Tropical Medicine held in Washington, D. C., May 2 and 3, Dr. M. C. Hall read a paper on "Carbon Tetrachloride as an Anthelmintic."

Dr. R. C. Julien, State Veterinarian of Indiana, spent several days in Washington during the early part of May, visiting Bureau laboratories, also the experiment station, and conferring with Bureau officials on matters relating to the cooperative tuberculosis and hog-cholera work in his State. Dr. Julien also visited the Maryland State Agricultural College at College Park, Maryland.

Dr. T. P. White, Assistant Chief of the Division of Hog Cholera Control, B. A. I., left Washington on April 23 on a trip through the South to confer with Bureau representatives and cooperating State officials on matters in connection with the hog-cholera work.

THE IMPORTANCE OF BACILLUS ABORTUS AS COMPARED WITH THAT OF OTHER INVADERS

By G. E. JORGENSEN

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IN the February issue of the A. V. M. A. JOURNAL there appears a splendid article by Dr. E. C. Schroeder, of the Bureau of Animal Industry Experiment Station, describing the meritorious work being done there in the investigation of infectious abortion. Meritorious, not only because of the extensive work being done, but also for the reason that the results have established certain facts. A careful perusal of this paper will convince one that definite results have been accomplished. One thing that I am satisfied with as having been accomplished is the establishment of the status of the *Bacillus abortus* of Bang, as far as its mode of dissemination, its mode of entrance and its normal habitat are concerned. The amount of work done in this connection justifies one in the belief that successful contradiction of these findings is not possible. It also quite clearly reaffirms the pathogenicity of this organism. However, the extent or prevalence of infections in which it is the etiological factor and the successful acquittal or inculpation of other microbial invaders has not, according to the present writer's opinion, been conclusively shown, and this question opens up an avenue for further study and investigation.

There are two factors quite antagonistic to successful progress in the investigation of genital diseases. One is the lack of proper facilities for study of this question by the field worker. The other is the unfortunate existence of two classes of workers, each ultraradical as far as his views and beliefs are concerned. One is the worker who absolutely insists that no etiological factors are worth considering in genital infections except the *Bacillus abortus* of Bang. The other is equally insistent that the Bang organism is entirely ignorable and that genital infections are invariably of other origin, when as a matter of fact if a happy medium, as it were, could be struck something quite definite in the control of this serious insidious malady might be accomplished. A practitioner reads these two diametrically opposite opinions and the net result is confusion and a tendency toward the development of skepticism.

There are absolutely no facts upon which to base the contention that the *Bacillus abortus* is not capable of causing fetal death and expulsion. Neither is there any evidence to show that other organisms are not equally capable of producing the identical results. Furthermore, there has been nothing developed to show to what extent either form of the presumed etiological factors is prevalent.

Some years ago it was taken for granted that the only etiological factor worthy of consideration in swine diseases was the filterable virus of hog cholera. Since its control has been accomplished we find ourselves merely on the threshold of the solving of the etiology of swine diseases, and today we are face to face with a most confusing and chaotic situation as far as the diagnosis of swine diseases is considered. It is in my opinion equally fallacious to assume that *Bacillus abortus* is the only etiological factor worthy of consideration merely on the establishment of its pathogenicity in genital infections.

For a number of years the present writer has been focusing his attention and efforts on the eradication or control of reproductive inefficiencies, and it has been his experience that in several herds where numerous abortions were yearly occurrences the agglutination test failed to give positive results, and it was impossible to demonstrate the *Bacillus abortus* either microscopically or by attempts at culture, due consideration being given to its peculiar physiological characteristics. However, streptococci and organisms identical morphologically and culturally with *Bacillus pyogenes* were demonstrated both in the infected cows and in the offspring or aborted fetuses. It has also been his experience in other instances that the administration of specific antigens both killed and alive gave no results in herds where the agglutination test was negative, but that the results in herds where the test was positive merited further consideration. Yet the herds seen in which *Bacillus abortus* could be demonstrated were relatively few as compared with those in which other invaders could be demonstrated.

Furthermore, in the control of genital anomalies consideration must be given to other factors, inasmuch as the reproductive function is a most complex one. There is not any evidence available to show that the genital system is more resistant to the invasion of pathogenic organisms than the rest of the body,

hence it may be assumed with a fair degree of propriety and certainty that the lesions observed by the writer and others who have worked with genital diseases can have some bearing on the reproductive function. When spermatozoa, which, while alive, yet show clearly the presence of pathological conditions, are seen time after time, and clearly recognizable degenerations in the testicle, vas and seminal vesicles, it would seem that when the progeny of such bulls are aborted in the early stage of embryonic life without the presence of *Bacillus abortus* being demonstrable in spite of careful, painstaking efforts, yet the presence of other invaders is clearly observed, the conclusion that the latter and not *Bacillus abortus* were the actual etiological factors would be most logical.

That such infections do occur would seem to be further strengthened by the statement in Dr. Schroeder's paper in which he mentions a herd in which a series of abortions followed the purchase of a bull. It was shown that *Bacillus abortus* was present in this bull's genitalia. Yet the findings at the station showed conclusively that infection by the genital route of non-pregnant cows was not the rule, and the author assumes that each cow partook of and ingested some of this bull's penile secretion. I will admit that such could be possible, yet to me it appears as highly improbable, and as long as in this case it is a matter of presumption, I should say that this bull harbored some other infection which was able to propagate and cause a disturbance in female genitalia even though it was admitted via the genital route, or that weak and imperfect spermatozoa were the result of weak and nonresistant fetuses being formed.

There is no intention on the part of the present writer to discredit in any way the work being done by Dr. Schroeder and his coworkers. On the other hand, as one who has worked with this condition for years and who has experienced that bitter feeling of utter defeat and inability to cope with a most insidious and (if that word may be used) mysterious anomaly, I am in a position to appreciate the amount of work which must have been done, the laborious, monotonous and nerve-racking repetition of experiments which have been expended in the results so far established as facts. When the writer considers these features he has nothing but praise and admiration for the laudable efforts made by these men under the poorly remunerative con-

ditions of the Bureau and the almost discouraging lack of recognition and proper support by the Nation.

The only motive which the writer advances for the creation of this paper is that, besides a desire to express at least his commendation and appreciation for the work which has been done at this station, he desires to point out emphatically that there are, without a shred of doubt, other etiological factors responsible for infectious abortion besides the *Bacillus abortus*. Such at least is the experience of men who have met and grappled with this disease as it exists in the field, absolutely isolated from the artificial environment of the laboratory. With this expression of his opinion he desires not only to urge these men on to further efforts, but to make the suggestion that careful consideration be given to every feature which may interfere with the procreative function. That of course includes not only a consideration of the direct effect of microbial invaders upon the well-being of the young embryo, but also the effect of such upon the specific genital cells before the phenomenon of fertilization has occurred. He is as sincere in his condemnation of the worker who can see only organisms not identical with *Bacillus abortus* as he is of the worker who insists that no other organism except *Bacillus abortus* is worthy of consideration in fetal death and expulsion. Perhaps when some of the concerted attention now focused on the Bang organism has been in part diverted to a study of other organisms more definite results may be expected. As a matter of fact, one might assume that other factors have been recognized at the Bureau station, inasmuch as Dr. Schroeder states that inasmuch as not every diphtheroid growth in a child's throat can be laid to the Klebs-Loeffler bacillus, so can not all cases of abortion be the results of *Bacillus abortus*. If they are not due to this organism it is self-evident that they must be due to other factors; hence the logic and value of a suggestion that such other possible causes be given due consideration.

MISCELLANEA ANATOMICA

I. REMARKS ON ANATOMICAL INSTRUCTION AND STUDY

By SEPTIMUS SISSON

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IT IS GENERALLY ADMITTED without argument that sound, practical and lasting anatomical knowledge is almost exclusively the product of careful and methodical work in the laboratory. But it is not sufficiently comprehended that such information can only be acquired slowly by the average student, and that it is therefore necessary to make very full provision in the schedule for this work. Still less does it seem to be realized that the training which the student should receive in the anatomical laboratory, in making full and accurate observations on the material and in acquiring the greatest possible skill in handling instruments, is of extreme value in subsequent courses, especially surgery, physical diagnosis, and pathology.

In order to make the transfer of this training as complete as possible it is essential that the methods used in the anatomical work should approximate as nearly as is feasible those to be employed in the courses in which the results of anatomical study are to be applied. Probably the best concrete example of what is here intended is the practice of studying the structure of the living animal by careful and thorough inspection and palpation. The writer has advocated this procedure for a good many years and is firmly convinced that college authorities make a very serious mistake if they fail to provide adequate facilities for this most valuable means of correlating the anatomical and clinical branches. In the limits of this report no detailed statement can be made of the numerous advantages of the method here strongly recommended. Many of these advantages will be evident at once to any wide-awake clinician and to every anatomical teacher who is sufficiently aware of clinical requirements in this respect.

The facilities for carrying out this mode of study and in-

struction are essentially the same as those for any other modern and strongly objective method—viz., necessary provision in the schedule for time, adequate quarters and material, and sufficient well-trained and experienced instructors. Good results can be obtained only when students are handled in small groups. The number of students in each group should, if possible, not exceed six. Subjects for this purpose should be kept immediately adjacent to the dissecting room, so that they are promptly available whenever desired during dissection, thus avoiding loss of time and disorganization of the work.

The method should be used in connection with the study of the skeleton and should be continued thereafter throughout the anatomical courses. In this way the student acquires skill and accuracy in observation and palpation as well as genuinely practical knowledge which furnishes a secure foundation for good clinical work. Scarcely less important is the fact that he gets an insight into the practical applications of his hard-earned anatomical knowledge and naturally takes a greater interest in his work. Finally, in conformity with the well-established psychological principle of association, the facts become more firmly established in his mind and can be readily recalled when needed.

In the dissecting room the student should use the same kind of instruments as are used in surgery as far as this is possible. At the beginning he usually needs to be taught how to handle them properly, to keep them clean and in good working order. Experience shows that very few students know how to sharpen a knife, and instructors should demonstrate this very elementary but essential procedure at once to prevent students getting into the bad habit of attempting to dissect with a blunt scalpel. Scissors—which should have both points blunt—are still not used nearly as much as they should be in dissecting. Perhaps this circumstance has had an important influence on veterinary operative technique. It is a notable fact that many veterinary surgeons use scissors to a very small extent as compared with their confrères in human practice. A very large amount of dissection can be done much more rapidly and effectively with scissors than with scalpels, and the acquirement of skill in this respect is good training for rapid, yet clean and safe, operative procedure later on.

The principle and practice of conservation in surgery have long been regarded as fundamental. But there has been little recognition of this idea in veterinary dissection until recently. Of course in the days of short courses and unpreserved subjects, dissection was largely a race against time and decomposition, and speed was therefore a prime necessity. In these days there is no such excuse for rough and slovenly work, at least in those colleges which allot a proper amount of time and instructional force to the anatomical department. Students should be taught, for example, that careful dissection and study of the fasciæ are necessary, since they are in many respects of great surgical importance and of much physiological interest. Some of us can recall that in our student days these ubiquitous membranes seemed to be regarded simply as a nuisance which concealed structures of real importance, and were therefore to be dealt with in the most summary manner possible. Similarly the limits of the joint capsules, synovial sheaths and bursæ should be studied accurately.

It seems decidedly advisable to require a student to dissect and learn the larger vessels and nerves even during the first year's work, when his chief concern is to gain a thorough knowledge of the bones, joints, muscles and viscera. The reasons for this are (1) that he may not get the careless habit established of reflecting skin, fasciæ and muscles without looking out for underlying structures—a habit difficult to overcome later when such procedure will prevent acquiring the kind of anatomical knowledge necessary for the successful practice of medicine and surgery; (2) that the student may acquire a sufficient working knowledge to form an adequate basis for good topographic dissections and for intelligent use of sections.

It would seem that the pedagogic difficulties which confront anatomical teachers are not fully appreciated by college authorities or even by their colleagues. These difficulties have increased during recent years until the conscientious teacher sometimes almost despairs of meeting them successfully. With the passing of the horse-doctor type of specialist and the great extension in the range of anatomical knowledge required in the clinical years of the curriculum, the problem of selecting from the vast array of anatomical facts those which are actually essential tests severely the judgment and courage of the most experienced

teacher. The physiologist, the pathologist, the surgeon, the professor of medicine each demands that the student must come to him provided with certain categories of anatomical facts. The sum of these irreducible minima is almost staggering, and it must be attained in two years by students fresh from the often painless methods of the high school, who must first be taught how to observe and to accumulate a difficult scientific terminology.

Attention may properly be directed here to an unfortunate and quite unnecessary difficulty encountered by instructors and students of anatomy. The reference is to the archaic and confused anatomical terminology which persists to a great extent in clinical instruction and literature. This is a serious hardship to the student and should be remedied promptly. It is high time clinical instructors ceased to speak or write of os innominatum, extensor suffraginis, flexor metatarsi, Steno's and Wharton's ducts, right and left sacs of the rumen, plantar nerves of the fore limb, etc. It should be clearly recognized that the determination of anatomical names and facts is to be left in the hands of their anatomical colleagues. It is true that anatomical terminology has been in a rather fluid state during the past decade, but it is equally true that great progress has been made in this respect in the anatomical instruction of our colleges; many useless synonyms have been dropped, undesirable names eliminated, and a long step taken toward a more uniform and sensible nomenclature. This change has removed a heavy burden from students in this very important branch, thus allowing their energy to be devoted more exclusively to the acquisition of really useful knowledge. It is very unfair to the student and entirely indefensible from a pedagogic standpoint that clinical instructors should attempt to inflict on him a mass of obsolete terms, many of which are no longer to be found in any anatomical work known to the student—some of them in fact have never occurred in any book on anatomy. Much of our clinical literature is badly in need of revision in this respect, and the opportunity might well be utilized to bring it up to date in other directions. It is earnestly desired by anatomical teachers that they may have the prompt and thorough cooperation of their colleagues in other branches in this matter.

But other difficulties are not so easily disposed of. The selec-

tion of matter is one of the hardest problems, as has already been indicated. We may eliminate minor attachments of muscles (especially those which are deep-seated), ignore the smaller vessels, and deal with the finer structure of the central nervous system and sense organs as briefly as is consistent with the demands of physiological study. On the other hand we may emphasize those regions where injuries and abscess formation are most common and where operations are frequently necessary. But shrapnel fragments, barbed wire and other traumatic agencies do not exercise any perceptible selective action, and in such cases the practitioner usually has no opportunity of refreshing his memory by reference to the literature.

The problem would be greatly simplified in some respects if it were known what field of activity the student intended to enter. But this matter is not usually decided till late in the course, and in many cases not then; often radical changes of work are made after graduation without any special preparation therefor. Some of our best medical schools are beginning to offer elective courses, partly to relieve the congestion in the required work, and partly to meet the needs of specialization in practice. Similar action in the veterinary colleges would no doubt be indicated if our students had as good biological training as is now required for entrance to the medical colleges, provided also that specialization in practice was established. Even under our present circumstances a small amount of elective work seems desirable. But this does not help matters much, as such work is chiefly additional and does not replace required courses.

It has long been customary to devote a considerable part of the time to routine lectures on anatomy. This practice must be abandoned or at least a great reduction made in the time so utilized. It is becoming generally recognized by thoughtful teachers that the lecture method is relatively inefficient and that the time can be much more effectively employed in quizzes and demonstrations. It is sometimes urged that the lecture is the best means by which the instructor can select the material and emphasize matters of greatest importance. But in general these desirable results can be secured better by the quiz and by laboratory conference and demonstration. In addition the latter methods provide the only adequate and reliable

means by which the instructor can keep constantly informed as to the progress of his students, and—a no less important desideratum—the student can gauge his success in his work. One of the most valuable features of the recitation is the training it gives the student in expressing himself accurately and clearly. In a properly conducted quiz the student is required chiefly to state the results of his observations in the laboratory, and it should not be possible for him merely to repeat statements which he has read or heard in lectures. It is decidedly stimulating to the student to know that he will frequently be called upon to demonstrate his knowledge of the subject and that his views will be subjected to the criticism of the instructor and of his classmates.

It must be admitted with regret that, with very few exceptions, our colleges have not made even fairly good provision for successful anatomical instruction. In general, the quarters allotted to the anatomical department are inadequate and not well designed for the purpose, salaries are insufficient to obtain or to retain well-trained instructors, and sufficient funds are not available for equipment and material. This state of things can not be permitted to persist in the development of our educational facilities if anatomical teachers are to be held responsible for the proper training of students in this important branch, on which so much of the subsequent work is based in a large degree. It would seem desirable that administrative officers inform themselves as to what has been done in this matter by the better class of medical schools, in which the anatomical department has received its due share of funds and facilities.

A good museum has always been regarded as an important feature of the college plant. Too often, however, it is chiefly a store room or a heterogeneous assemblage of curiosities and material of little instructural value. The development of an anatomical collection which is constantly and effectively used for teaching purposes is a very different matter. Its maintenance, growth and utility involve a large amount of expert work and no small expenditure. In order to furnish the desired information and to be directly available for inspection and study, specimens must be carefully selected and prepared, properly installed in containers and cases so as to be visible, and labeled and catalogued in order to be found readily. So far as

possible the arrangement should be such that the specimen need not be removed for examination. In some buildings halls and corridors can be used for the installation of cases containing specimens to which reference is frequently desirable. The placing of skeletons and other bone preparations (preferably in cases) in the dissecting room is very useful, as it furnishes the student with the means of refreshing his memory with regard to areas of muscular and ligamentous attachments, vascular and nervous relations to the bones, visible and palpable prominences, etc.

In addition to constant supervision in the dissecting room, students should be provided with printed or mimeographed dissection guides. This insures orderly and effective procedure and trains the student in careful and systematic methods of work. It also conserves the time and energy of instructors and makes it possible for them to demonstrate important points, assist the student in technical difficulties and quiz on the material in hand. Tact and judgment should be used in answering questions, and students should not be furnished with information which they can obtain without special difficulty. "Spoon feeding" is highly undesirable in the case of men who are preparing themselves to solve the problems of medicine and surgery.

Another difficulty is the matter of linking up the anatomical work with related branches of the curriculum. The need of correlation is of course unquestioned. The problem is to secure this correlation without undesirable overlapping. It has long been customary in anatomical study to deal with the action of joints and muscles and it is no doubt desirable to allude briefly to the functional significance of other structures. Pathological and clinical implications may also be mentioned with advantage at certain points. But considerable care is needed in this procedure, as there is a real danger of dislocating the student's attention from the main object—viz., the acquisition of anatomical knowledge. It seems best to insure a fuller comprehension on the part of the student of the professional objects of anatomical study and of its relations to the pathological and clinical branches by means of a course in applied anatomy which is organized in content and method for this specific purpose.

In order to keep this paper within reasonable limits it has

seemed necessary to confine attention mainly to principles and methods, and thus to omit consideration of some materials of instruction such as X-ray and other photographs, charts, lantern slides, models, etc. Reference to these and other matters of interest may be made at some future time.

In closing the writer feels the need of emphasizing the essential unity of the whole subject of anatomy and regards as a serious pedagogic error the unnaturally sharp division of the branches of the subject which is still prevalent in the organization and instruction of some of our veterinary schools. In this respect we might well pattern after the methods of the better type of medical colleges, in the great majority of which all of the anatomical work is included in one department. This is necessary in order to attain reasonable efficiency, coincident with the minimum expenditure of effort and money, and for the following reasons:

1. It is the only means by which the proper correlation of the various branches can be insured and the student enabled to gain a comprehensive and connected knowledge of the whole subject.
2. It is the only certain way to prevent unnecessary duplication of instruction and equipment.
3. It is the only favorable arrangement for advanced and graduate work, and thus for the broad and thorough training of men for research and teaching.

The foregoing advantages are of the greatest importance and there is little to put on the other side of the scales except prejudice, tradition and inertia—a trio which always stand in the way of progress. Unfortunately the situation is complicated by personal, departmental or college jealousies in many cases, and administrative authorities often prefer to “let sleeping dogs lie” in the hope that “things will work themselves out” or that death or mundane translation will remove some obstacles from the path of unpleasant duty.

Probably the only arguments which have been brought forward against the modern type of organization that are worthy of any consideration are (1) that it tends to inhibit specialization, and (2) that the practical applications of the subject are sacrificed, while the scientific or morphological aspects are unduly emphasized. With regard to the first of these objections

it may seem to be merely uttering a platitude to say that too early and too narrow specialization is to be avoided, but sometimes these obvious facts need to be reiterated. One becomes painfully aware of such need when we are confronted with the pedagogic crime of a man being put in charge of instruction in a major subject or an important branch immediately after graduation! On the other hand, experience has fully demonstrated that in a well-organized department judicious specialization is encouraged and cooperation in teaching and investigation soon becomes habitual.

With regard to the objection that in some departments the purely morphological or scientific data and concepts are emphasized at the expense of facts of immediate professional importance and of practical applications, it must be admitted frankly that this is quite too often the case and that it is a very serious defect in instruction. But this is not really a defect of organization. It is essentially a defect of personnel and is one which is by no means confined to the anatomical part of the curriculum. In many cases it is due to the instructor's lack of knowledge of the subject, since the instructor, of course, can teach only that which he knows something about. In other cases the teacher has little or no knowledge of, or interest in, the special requirements of veterinary students. Instances are not wanting of a feeling on the part of a professor that it is really beneath his dignity to teach veterinary students and that he can not condescend or trouble himself to organize the work to meet their needs. The incorporation of two or more of these deficiencies in one instructor is by no means uncommon, and the embodiment of all of them has been observed.

The eradication of rabies from Great Britain has been officially announced, and the muzzling order and restrictions on movements of dogs have been removed. After sixteen years of freedom of the United Kingdom from rabies the disease was reintroduced in 1918 by an imported dog which escaped the attention of the authorities. This one case is said to have been responsible for 129 cases of rabies in two counties. Other infected dogs were brought in during demobilization. The last known case occurred in June, 1921.

THE PRESENCE OF DIPHTHERIA ANTITOXIN IN THE BLOOD OF CERTAIN NORMAL HORSES AND ITS DEMONSTRATION BY THE SCHICK TEST

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IN THE COURSE of experimental work with the Preisz-Nocard bacillus toxin and serum from normal horses it was deemed advisable to investigate the protective properties of serum from normal horses against several M. L. D.¹ of diphtheria toxin for guinea-pigs.

In reviewing the literature on this subject it was found that considerable attention was being given to the treatment of diphtheria in man in Germany by the use of normal horse serum, this method having been advocated rather strongly by several investigators and data submitted to substantiate their claims that the use of normal horse serum was as efficient as specific antitoxin. Numerous reports on the application of normal horse serum in the treatment of diphtheria in man showed, however, that it was not as efficient as specific antitoxin, while experimentally it was proved that normal horse serum possessed some degree of neutralizing toxin, but that it was slight compared to specific antitoxin.

Minett (1) has reported the recovery of diphtheria bacilli from the horse. He states that but one previous instance in which diphtheria bacilli have been recovered from the horse is recorded—that by Cobbett in 1900. The latter also observed at that time that ten out of thirteen horses examined contained antitoxin in their blood.

To determine the protective properties of normal horse serum against diphtheria toxin the following procedure was employed: One cubic centimeter of serum from a normal horse was mixed with 2 M. L. D. for guinea-pigs; the mixture was left to stand for one hour at room temperature and then injected subcutaneously into a guinea-pig.

The M. L. D. of the diphtheria toxin was determined as the smallest amount of toxin which was invariably fatal to medium-

¹ Minimum lethal dose.

sized guinea-pigs in ninety-six hours after subcutaneous inoculation.

Table 1 shows the results of an experiment conducted September 23, 1920, in which 2 M. L. D. of diphtheria toxin were mixed with 1 c. c. of serum from normal horses, the mixture left to stand at room temperature for 1 hour, and then injected subcutaneously into guinea-pigs.

TABLE 1.—EXPERIMENT IN INJECTING GUINEA-PIGS WITH NORMAL HORSE SERUM AND DIPHTHERIA TOXIN

Guinea-pig No.	1 c.c. serum from normal horses. Sample No.	Diphtheria toxin, 2 M.L.D. (C. C.)	Date injected	Result
1	122	0.02	Sept. 23, 1920	Dead Sept. 26, 1920
2	181	.02	do.	Dead Sept. 25, 1920
3	185	.02	do.	do.
4	192	.02	do.	Survived
5	268	.02	do.	Dead Sept. 25, 1920
6	491	.02	do.	do.
7	159	.02	do.	Dead Sept. 27, 1920
8	S-188	.02	do.	Survived
9	216	.02	do.	Survived
10	92	.02	do.	Dead Sept. 25, 1920
11	A	.02	do.	Dead Sept. 27, 1920
12	201	.02	do.	Dead Sept. 25, 1920
13	188	.02	do.	do.
14	194	.02	do.	Survived
15	203	.02	do.	Dead Sept. 25, 1920
16	120	.02	do.	do.
17	126	.02	do.	Survived
18	.....	.02	do.	Dead Sept. 25, 1920
19	.....	.02	do.	do.
20	.....	.02	do.	do.
21	.....	.01	do.	Dead Sept. 27, 1920

Summarizing, Table 1 shows seventeen serums from normal horses in quantities of 1 c. c., mixed with 2 M. L. D. of diphtheria toxin; the mixtures stood at room temperature for 1 hour and were then injected subcutaneously into guinea-pigs. Of this number, serum from five horses, or about 30 per cent, protected guinea-pigs. Repeated tests on the serums giving protection resulted as originally.

Samples Nos. 192, 194 and 126, showing protective properties, and samples Nos. 122, 181, 185, 268, 491, 159, 201, 194, 203 and 120, showing no protection, were obtained from horses on the range of one of the Indian Reservations in Arizona, and had been forwarded to the Pathological Division for the serum test for dourine. These samples had given negative results to the test for this disease.

Samples Nos. S-188 and 216, giving protection, were obtained from work horses at the Bureau Experiment Station at Bethesda, Md. The history of these horses over a period of years

shows that they were never injected with, or intentionally exposed to, diphtheria toxin or bacilli.

One cubic centimeter each of samples Nos. 192, 194, 126, S-188 and 216 was mixed with an L+ dose of diphtheria toxin; the mixture was allowed to stand at room temperature for 1 hour and was then injected subcutaneously into guinea-pigs. The pigs in every case died within the same period as the toxin control pigs, indicating that these serums contained less than 1 unit of antitoxin per cubic centimeter. No attempt was made to determine the amount of antitoxin in these serums by Römer's method.

To determine whether serums of normal animals other than horses, used in quantities of 1 c. c., would neutralize 2 M. L. D. of diphtheria toxin, the following experiment was made: One cubic centimeter of serum from each of five normal rabbits and one guinea-pig was mixed with 2 M. L. D. of diphtheria toxin; the mixture was left to stand at room temperature for one hour and then injected subcutaneously into guinea-pigs. In no case did any of these serums show any protective properties.

TABLE 2.—EXPERIMENT IN INJECTING GUINEA-PIGS WITH RABBIT AND GUINEA-PIG SERUM AND DIPHTHERIA TOXIN.

Guinea-pig No.	1 c.c. serum	Diphtheria toxin 2 M.L.D. (C.C.)	Date injected	Result
1	Rabbit 1	0.08	Oct. 24, 1921	Dead Oct. 27, 1921
2	Rabbit 2	.08	do.	do.
3	Rabbit 3	.08	do.	do.
4	Rabbit 4	.08	do.	do.
5	Rabbit 5	.08	do.	do.
6	Guinea-pig 1	.08	do.	do.
7	.....	.08	do.	do.
8	.....	.08	do.	do.
9	.....	.08	do.	do.
10	.....	.04	do.	Dead Oct. 28, 1921

THE SCHICK TEST (2)

One cubic centimeter of serum from each of twelve horses from the Bureau Experiment Station at Bethesda, Md., whose history over a period of years showed they had never been injected with diphtheria toxin or bacilli, was mixed with 2 M. L. D. of diphtheria toxin, the mixture left to stand at room temperature for 1 hour and then injected subcutaneously into guinea-pigs. The results are shown in Table 3.

Of the twelve serums tested, four gave protection to guinea-pigs against 2 M. L. D. of toxin.

TABLE 3.—EXPERIMENT IN INJECTING GUINEA-PIGS WITH HORSE SERUM AND DIPHtheria Toxin.

Guinea-pig No.	1 c.c. serum normal horse Sample No.	Diphtheria toxin, 2 M.L.D. (C.C.)	Date injected	Result
1	116	0.08	Nov. 22, 1921	Dead Nov. 25, 1921
2	194	.08	do.	do.
3	241	.08	do.	do.
4	242	.08	do.	do.
5	243	.08	do.	do.
6	244	.08	do.	do.
7	245	.08	do.	do.
8	246	.08	do.	do.
9	240	.08	do.	Survived
10	54	.08	do.	do.
11	216	.08	do.	do.
12	128	.08	do.	do.
13	.....	.08	do.	Dead Nov. 25, 1921
14	.....	.08	do.	do.
15	.....	.08	do.	do.
16	.....	.08	do.	do.
17	.....	.04	do.	Dead Nov. 26, 1921

It was decided to apply the Schick test to all of these animals in order to determine the specificity of the protective properties of these serums.

Technic of the Test (3): The Schick test consists in the injection between the layers of the skin of a small amount of diphtheria toxin. The test, which is a purely local reaction, depends on the principle of the destructive action of diphtheria toxin on surrounding tissue cells with subsequent inflammation of the part. A positive reaction indicates an absence of antitoxin in the individual, while a negative reaction indicates that the toxin has been neutralized by antitoxin.

In applying the Schick test to human beings it is the usual practice to inject one-fiftieth of a guinea-pig M. L. D. suspended in 0.1 c. c. or 0.2 c. c. saline solution into the layers of the skin of the forearm below the bend of the elbow. As a control the same amount of toxin heated at 75 degrees C. for 10 minutes (which destroys the toxin) is injected in a similar manner in the other arm. This serves to act as a control on the autolyzed protein of the diphtheria bacillus present in the test fluid.

In applying the test to horses it was considered advisable to use as the test dose a larger amount than was used in human beings, the desired quantity being that amount which would give a positive reaction where there was no antitoxin, but not so large an amount as to produce sloughing at the site of injection. The proper amount of toxin was found to be $1\frac{1}{2}$ M. L. D. for the guinea-pig, suspended in 0.3 c. c. salt solution.

The M. L. D. was found to be 0.04 c. c. A dilution of 1 part of toxin to 4 parts of salt solution was then made; 0.3 c. c. of this mixture contained 0.06 c. c. of toxin, or $1\frac{1}{2}$ M. L. D.

The site of the injection was the lower eyelid, and the technic employed was the same as that used in the intradermic or intrapalpebral mallein test (4). The test should be applied only when there is no inflammatory condition of the eye. A twitch should be applied to the upper lip or the ear of the animal so that the head may be held still during the operation. The injection is made into the dermis of the lower lid, about one-third of an inch from the edge, and halfway between the inner and outer canthi. It is not necessary to disinfect the site of injection.

A Leur syringe and 26-gauge needle were used, and 0.3 c. c. of the toxin was injected into the lower lid of the left eye. As a control on the autolyzed protein of the diphtheria bacillus contained in the test fluid, 0.3 c. c. of a dilution of the toxin (1 to 4) which had been heated at 75 C. for 10 minutes was injected into the lower lid of the right eye.

The following horses were tested: Nos. 116, 194, 241, 242, 243, 245, 216, 128, 240 and 54.

A positive reaction begins to make its appearance in 24 hours, and is at its height in 48 hours. The reaction begins with a swelling of the lower eyelid, which is very marked in 48 hours, at which time the upper eyelid may be affected, the eye being half closed from the edema of the lids. In some cases there is considerable laceration, followed by a serous discharge containing pus flakes or entirely purulent in character. In most cases there is a peeling of the epidermis at the point of injection, leaving a somewhat raw appearance as if the skin had been scraped with a dull knife. The eye is sensitive to light and appears painful. After 48 hours the swelling diminishes, and the eye returns to normal in one week or less, leaving a somewhat scaly appearance of the epidermis of the lower lid.

The following horses gave a positive reaction to the Schick test: Nos. 116, 194, 241, 242, 243, 245. The reaction was well marked in each instance and could be easily seen at a distance. The following horses gave a negative reaction: Nos. 216, 128, 240 and 54. The control eye in each case was observed carefully at

each reading, but in no instance was there any swelling, the eye remaining unchanged. The results are shown in Table 4.

TABLE 4.—SCHICK TEST.

Horse No.	Schick test	Antitoxin in serum
116	+	None
194	+	do.
241	+	do.
242	+	do.
243	+	do.
245	+	do.
216	—	Present
128	—	do.
240	—	do.
54	—	do.

It will be seen from Table 4 that those animals whose serums showed antitoxic properties gave a negative Schick test, while those animals whose serum showed no antitoxic properties gave a positive Schick test.

Ten days after the test serum was drawn from the horses which had given a positive reaction. One cubic centimeter of serum from each animal, drawn before the Schick test (B) and ten days after the test (A), was mixed with 2 M. L. D. of toxin, left to stand at room temperature 1 hour, and injected subcutaneously into guinea-pigs. The results are shown in Table 5.

TABLE 5.—EXPERIMENT WITH SERUM DRAWN BEFORE AND AFTER SCHICK TEST.

Guinea-pig	1 c.c. serum ¹ from horse No.	Diphtheria toxin, 2 M.L.D. (C.C.)	Date injected	Result
1	116-B	0.08	Dec. 20, 1921	Dead Dec. 23, 1921
2	116-A	.08	do.	Dead Dec. 27, 1921
3	243-B	.08	do.	Dead Dec. 23, 1921
4	243-A	.08	do.	Survived
5	241-B	.08	do.	Dead Dec. 23, 1921
6	241-A	.08	do.	Survived
7	242-B	.08	do.	Dead Dec. 23, 1921
8	242-A	.08	do.	do.
9	245-B	.08	do.	do.
10	245-A	.08	do.	do.
11	194-B	.08	do.	do.
12	194-A	.08	do.	do.
13	.....	.08	do.	do.
14	.....	.08	do.	do.
15	.....	.08	do.	do.
16	.....	.04	do.	Dead Dec. 24, 1921

¹ B denotes serum drawn before Schick test; A, serum drawn ten days after Schick test.

Horses Nos. 243 and 241, whose serum gave no protection before the injection of the toxin for the Schick test, 10 days after the test gave complete protection, while the serum of horse No. 116 gave protection for 7 days. It is of interest to note that these horses did not give as intense a Schick reaction as horses Nos. 194, 245 and 242.

January 3 a second Schick test was made on horses Nos. 194, 245, 242, 243, 244 and 116, with the results shown in Table 6.

TABLE 6.—SECOND SCHICK TEST.

Horse No.	First Schick test, Dec. 5, 1921	Antitoxin in blood before first test	Antitoxin in blood 10 days after first test	Second Schick test Jan. 3, 1922
194	+	None	None	+
245	+	do.	do.	+
242	+	do.	do.	+
243	+	do.	Present	—
241	+	do.	do.	—
116	+	do.	do.	—

Horses Nos. 243, 241 and 116 gave a negative reaction, while horses Nos. 194, 245 and 242 gave a positive reaction, which, however, was not as marked as in the first test.

Sufficient antitoxin was produced in horses Nos. 243, 241 and 116 as a result of the intradermic injection of diphtheria toxin in the first Schick test to allow the same to be demonstrated in the blood of these animals ten days after the test, and to give a negative Schick reaction four weeks after the first test.

DISCUSSION

From the foregoing work it appears that serum from about 30 per cent of normal horses used in quantities of 1 c. c. will protect guinea-pigs against 2 M. L. D. of diphtheria toxin. That this protection is due to specific antitoxin is indicated by the following facts:

(1) That serum from all normal horses does not contain this property.

(2) That a limited test on serums from five normal rabbits and one guinea-pig showed none of these serums to contain protective substances.

(3) That those horses whose serums showed no protective properties against diphtheria toxin gave a positive Schick test in 100 per cent of the cases tested, while those horses whose serums showed protection gave a negative Schick test in 100 per cent of the cases tested.

Minett in his article on diphtheria bacilli in the horse states that Cobbett from his experience was of the opinion that the horse should be considered as a possible source of diphtheritic infection in man. Minett is more of the opinion that the horse

receives the infection from man, wounds being easily infected with the diphtheria organism from some human attendant who happened to be suffering with diphtheria or was an actual carrier.

The writer is of the opinion that the diphtheria antitoxin found in the blood of certain normal horses is there as a result of infection with the diphtheria bacillus. It is quite common for horses to have wounds about the fetlocks and hoofs (calk wounds, interfering wounds, etc.), and it is probable that the diphtheria organism infecting these wounds results in the production of a limited amount of antitoxin.

The source of the diphtheria organisms infecting wounds is problematical, but the fact that certain serums containing antitoxin were from horses on one of the Indian Reservations in Arizona, where these animals were running on the open range as wild horses, and practically never in contact with human beings, leads to the belief that the infection is not obtained from human beings, but rather that the diphtheria organism is widespread in the soil or finds favorable medium for propagation in horses or in their surroundings.

CONCLUSIONS

1. There is a limited amount of diphtheria antitoxin in the blood of about 30 per cent of normal horses, sufficient to protect guinea-pigs against 2 M. L. D. of toxin.

2. The antitoxin in the blood of these horses is probably there as a result of infection of wounds with diphtheria bacilli, which may be present in the soil or surroundings of horses.

3. The Schick test applied to six horses whose serums showed no antitoxin resulted in positive reactions in all cases, while the test applied to four horses whose serums contained antitoxin resulted negatively in each case.

4. In certain horses sufficient antitoxin was produced by the Schick test for these animals to give a negative reaction four weeks later, and the antitoxin was demonstrable in the blood ten days after the first test.

5. The Schick test, as pointed out by Hitchens and Tingley (5), should be of practical value in determining the suitability of horses for the production of diphtheria antitoxin.

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VETERINARY WORK IN AFRICA

One of the services recently rendered by the Bureau of Animal Industry was that of assisting the veterinary adviser of Uganda, a British protectorate in Africa, in organizing the veterinary work of that region. This bureau receives numerous requests from foreign countries for assistance in the organization and perfection of various livestock activities. These requests deal with the solution of both technical and executive problems. The cooperation and good will of many foreign veterinary services have resulted in procuring valuable data on livestock and their products, tests, diseases, and prevailing conditions and methods. Such information is often of great value in connection with the department's quarantine service and in numerous technical matters.

WHY DOES AN ANIMAL AFFECTED WITH GLANDERS GIVE A REACTION WHEN INJECTED WITH MALLEIN, WHILE A HEALTHY ANIMAL DOES NOT? ¹

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THE EXPLANATION of mallein phenomena is based upon two theories. The first theory, which prevailed up to a few years ago, had for its foundation the so-called Ehrlich side-chain or receptor theory. The second is based upon the newer theory of ferments and antiferments as advocated by Abderhalden, Friedberger, Vaughn, Bordet, Jobling, Peterson and others.

While the Ehrlich theory falls short of fully accounting for the changes manifested by the tissues of glandered animals when exposed to the influence of mallein, at the same time it has furnished a stimulus for the further study of the phenomena incidental to immunity and anaphylaxis that has proven to be of inestimable value from an immuniological standpoint, and it is well worthy of discussion in this connection.

Ehrlich assumed that the cells of the body obtain their nutrition from the blood or lymph with which they come in contact. This power of appropriating food on the part of cells is vested in certain cell substances which he calls cell receptors, having a combining affinity for food substances. These receptors may be of simple constitution, adapted to taking up relatively simple substances, or they may be complex and able to anchor large and complex molecules of various kinds. Each body cell may possess a large quantity or number of receptors of different combining affinities and different degrees of complexity.

It can be readily understood that when bacteria or other foreign cells or their products are introduced into the body proper, the combining affinities of certain receptors may be satisfactory for the bacterial substances which are protein in character, just as they are satisfactory for food substances. The tendency is, according to Ehrlich, for cells to acquire greater quantities or numbers of receptors having a specific combining affinity for

¹This paper was prepared by Dr. Archibald several months before his death, which occurred February 4, 1922. It was read at a meeting of the Bay Counties Veterinary Medical Association of California, March 14, 1922.

protein elements, bacterial or otherwise, when constantly exposed to such protein elements.

For instance, if, according to Ehrlich, we introduce the products of the glanders bacillus into a susceptible animal, or if such products are produced in such an animal as a result of an infection in the ordinary way, certain cells of the body acquire, as a result of the stimulation due to constant exposure or contact with such bacterial products, a large number of cell receptors having a combining affinity for the protein (toxic) products of the glanders bacillus. As a result of this increase of cell receptors, sufficient toxic elements of the glanders bacillus may be anchored to the cells, causing injury or destruction, and producing all the clinical manifestations of glanders or the phenomena observed when mallein is brought into contact with the tissues of a glandered animal locally or when injected subcutaneously and is taken up by the circulation, producing disturbances of a systemic nature.

In other words, when the cells of the body are constantly exposed to a protein substance, which may be or may not be toxic in character, these cells become, as it were, sensitized to that particular protein to an extent that, if sufficient protein (toxin) is available, enough may become anchored to the cells to cause their destruction or at least injury to them. It is this destruction or injury of cells which is manifested as the clinical symptoms of glanders or in the mallein reaction.

When mallein, then, is brought into contact with the sensitized cells of the glandered animal, its toxic elements, through the medium of Ehrlich's receptors, combines with such cells, causing injury or destruction, and as the result of such injury the cells lose their functional activity, and changes such as acidosis and other inflammatory phenomena are a sequence. Acidosis is a term applied to a condition where, as a result of functional derangement of cells, there is an increase in the production and retention of lactic acid or carbon dioxide which causes such cells or tissues to acquire a marked affinity for moisture from any source, hence the swellings and edemas incidental to mallein reactions.

When mallein is brought into contact with the cells of a healthy animal, the cells of such animal, not having been exposed to stimulation by the glanders bacillus protein, possess

no cell receptors having a combining affinity for the toxic products contained in the mallein. Such toxic products are consequently not anchored to the cells and can not produce injury, and they are eliminated by the ordinary channels of elimination without effecting damage of any nature, hence no anaphylactic or allergic reaction results.

It is a well-known fact that many glandered horses that have recently been given the mallein test (subcutaneous) will not react until five or six weeks have elapsed following the application of such a test. The reason for this, according to the Ehrlich theory, is that following the first injection of mallein and the consequent anchoring of large quantities of the toxin to the sensitized cells through the medium of the specific cell receptors, overstimulation of the cells is a result and cell receptors are produced in quantities beyond the capacity of the cells. As a result, the surplus cell receptors specific in character are discharged into the blood stream, constituting what Ehrlich calls free receptors or antitoxins. These free receptors, when exposed to the toxin molecules contained in the injected mallein, combine with them and render them inert before they can become fixed to the cells and cause injury; in other words, the animal is in a condition of either temporary or permanent immunity.

The foregoing explains, according to the Ehrlich theory, the difference between anaphylaxis and immunity. Anaphylaxis is the condition in which cells have become sensitized by being endowed with large quantities or numbers of cell receptors having a specific combining affinity for the toxin under consideration, while immunity is that condition where the individual has passed through the anaphylactic process, and its blood and body fluids have become saturated with free receptors whose mission it is to anchor and render inert toxic molecules before they can reach the cells.

According to the foregoing, Ehrlich's idea has been that anaphylactic or allergic reactions, such as those caused by mallein, are essentially and necessarily a cellular manifestation; but the fact that anaphylaxis can be passively transferred from one animal to another tends to disprove his theory in part at least.

The second theory, advocated by such authorities as Abderhalden, Bordet, Friedberger, Vaughn, Jobling, Peterson and

others, is based upon the assumption that the metabolic changes which go on in the body are regulated and controlled by elements known as ferments and antiferments. Just so long as these elements are present in normal amounts maintaining a proper balance the various physiological functions of the cells, tissues and body go on in a normal manner. On the other hand, if the inhibition or destruction of either of these elements occurs, then the metabolic order of things is upset and pathological changes result.

That there are such elements as ferments and antiferments can be and has been readily proven, so that in the discussion of this theory we are not dealing with hypothetical substances as in the case of the Ehrlich receptor theory.

If we accept the theory of ferments and antiferments we can quite easily reconcile ourselves to the popular idea in this connection that pathological changes in cells, tissue or the body as a whole incidental to the presence of bacteria or their products are not directly due to the reaction of such bacteria or their products. It appears that when bacteria and their products gain entrance to the body parenterally such substances undergo proteolysis, which lytic action renders available end products possessing anti-anti-tryptic characteristics. These anti-anti-tryptic end products, which are probably in the nature of lipoids, have the power of combining with or anchoring antiferments, rendering them inert or inhibiting their action. As a result of this the ferments which have been held in abeyance or under control by these antiferments are free to perform their function unrestricted, and autolysis or autodigestion of the individual's own cells or tissues is the sequence.

To recapitulate: First, we have proteolysis of bacteria or their products (toxins), with the liberation of end products anti-anti-enzymic in character; and, second, proteolysis (autodigestion) of the infected individual's own cells or tissues, giving rise to the various local and general inflammatory symptoms which constitute the clinical manifestations of a disease.

It is an accepted fact that of the two processes above described, the first lytic action—that is, the proteolysis of the invading organism or its products—is more or less a specific action, consequently the lytic elements (amboceptors) capable of bringing about such proteolysis are present in much greater

quantities or numbers in the body fluids of an animal undergoing active immunity or one that has become actively immune. Hence, when into such immune or partially immune animals bacteria or their products are introduced, the specific proteolytic substances perform their function, rapidly liberating anti-antiferment substances in such quantities and in such a short space of time that large quantities of ferments act unrestricted, producing antodigestion of cells and tissues. It is obvious, of course, that the severity of the clinical manifestations, whether local or general, will depend upon the amount of ferments that have been set free by the inhibition of the antiferment.

Now, coming down to the question of the mallein reaction, we must realize that an animal affected with glanders is undergoing active immunity processes, and, as a result, contains in its blood and body fluids specific immune elements proteolytic in character, whose mission is to digest and dissolve the glanders bacilli and their products which are constantly growing and being elaborated. Digestion of the glanders bacilli or their products by these specific proteolytic or bacteriolytic elements render available as end products the elements which have the power of inhibiting antiferment. If mallein is injected into the glandered animal, or is brought into contact with active tissues, certain protein elements contained in such mallein undergo specific proteolysis, from which result end products probably lipoidal in character, which fix antiferment, permitting ferment to attack unrestricted the cells and tissues, giving rise to the clinical manifestations which are recognized as a reaction.

If mallein is injected into a healthy animal no reaction takes place, because the blood and body fluids of the normal animal do not contain specific proteolytic substances for the glanders bacilli or for the protein elements contained in mallein; hence there is no inhibition of antiferment and no liberation of ferment; consequently there is no destruction of cells or tissues.

Of course there is always some proteolysis of bacteria, bacterial products or any foreign protein introduced parenterally into the healthy nonimmune animal, but in the absence of specific bacteriolytic or proteolytic substances lysis or digestion of such foreign protein goes on so slowly and so gradually that no appreciable damage is brought about by the liberated ferments.

It might be interesting to state in this connection that there are three major stages of a disease from an immunological standpoint—namely, incubation, anaphylaxis, and immunity. The incubation period is the time which elapses between the entrance of the invading organism and the first appearance of clinical symptoms, which represents the anaphylactic phenomena. The anaphylactic period continues until convalescence or immunity becomes evident.

In the case of glanders, it being a slow type of infection, there are no well-marked lines of demarcation between the three periods, hence the amount of anaphylaxis or immunity possessed by an affected animal will undoubtedly have an important bearing upon the severity and character of the reaction following the exhibition of a dose of mallein.

THE HORSE IS COMING BACK

The fourteen principal markets of the Central West show a total of 53,241 horses received the first two months of 1922. In a report just issued by the Horse Association of America, this shows a gain of 2,402 head, or 4.6 per cent. These figures do not take into consideration the chief eastern markets—Boston, Buffalo, New York and Philadelphia.

Wayne Dinsmore, secretary of the association, stated that the demand for horses is steadily improving throughout the country by reason of renewed activity in building, excavating, road construction and general merchandising. Paul Connolly, a well-known horseman of Philadelphia, stated that more horses had been sold in that city in the past three months than in any corresponding three months in the last ten years.

The demand for saddle horses is greater this year than it has ever been. Greater interest all over the country in horseback riding is the reason, according to horse authorities, for the spring's heavy demand for well broken, well bred saddle horses. Three weeks ago the sales in Lexington, Ky., set new records in the saddle horse field.

McINTOSH AND FILDES METHOD FOR ATTAINING SURFACE GROWTH OF OBLIGATE ANAEROBES

By WILLIAM S. GOCHENOUR

*Pathological Division, Bureau of Animal Industry,
Washington, D. C.*

IN THE FIELD of anaerobic study, success or failure depends primarily on the isolation of the anaerobic microorganisms in pure culture. While this can be accomplished in several different ways, probably the method in most common use at the present time is that of deep agar culture.

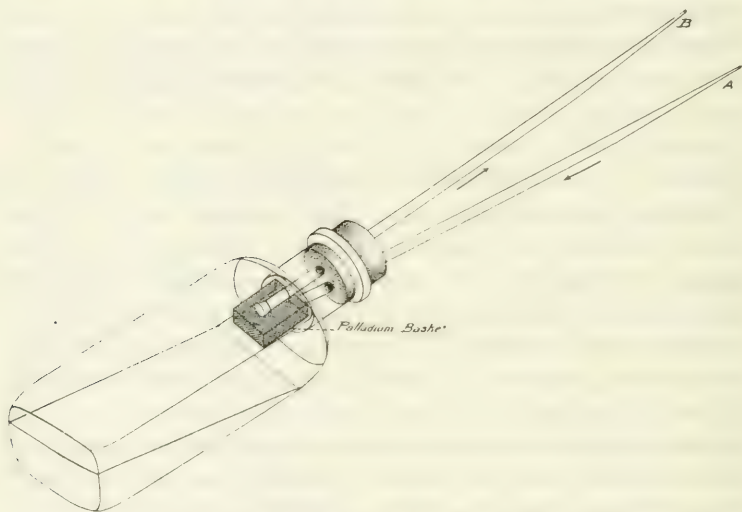
Without discussing the shortcomings of the several methods of anaerobic culture, it is the purpose of this paper to present the method devised by McIntosh and Fildes, which is one of surface plating in single test tubes in which deoxygenization is accomplished by means of the catalytic properties of metallic palladium. The method is very simple, requires but a little time to perform, and seldom if ever fails to produce well-developed surface colonies that compare favorably with aerobic surface colonies. In fact, the whole process is so quickly performed that it takes very little longer to make anaerobic cultures than to make aerobic cultures. This great advantage, together with the uniformly good results obtained, makes the process admirably adapted to every-day routine work. Furthermore, the fact that each individual tube is an anaerobic apparatus in itself is a factor of very great importance, because examination of each culture tube can be made without disturbing any other anaerobic tubes that may have been inoculated from the same or different materials under study. This is in direct contrast to those methods where a number of cultures are placed in a large jar in which deoxygenization has been effected by any one of the several methods.

Pfuhl (1) in 1907 made use of the catalytic properties of spongy platinum to obtain anaerobic cultures in broth tubes exposed to the air. Laidlaw (2) in 1915 suggested the use of platinized charcoal and colloidal platinum to remove the oxygen from anaerobic cultures. It was McIntosh and Fildes (3), however, who were the first to use a palladium catalyzer in surface cultivation.

The method about to be presented requires a minimum of apparatus. The only materials required in addition to the Kipp hydrogen generator are a number of soft rubber stoppers, with two perforations through each, glass tubing to fit, and small wire cloth carriers in which asbestos impregnated with palladium is held.

For the purpose of clearness a diagram of the apparatus is given instead of a verbal description. It will be observed that the only explanation necessary is the preparation of the palladium asbestos basket, which is made as follows:

One-fourth of a gram of finely divided arsenic-free asbestos



Apparatus for McIntosh and Fildes Method

wool is placed in a porcelain evaporating dish, and 1.5 c. c. of a 10 per cent solution of palladium chloride is added. In making this solution of palladium chloride it is usually necessary to add a few drops of concentrated hydrochloric acid to effect a perfect solution. The asbestos wool thus treated is then dried in the incubator over night, after which it is covered with carbon in a smoky gas flame and the palladium chloride reduced with a blow-pipe or reducing flame. The palladium-impregnated asbestos wool is then inclosed in a basket made of brass or copper wire gauze of approximately 30 meshes to the inch.

The method of operation is quite simple. Connect one end of the glass tubing A, which has been drawn to capillary bore,

to the hydrogen generator. Start the hydrogen generator and allow the gas to flow for one or two minutes. In this way the greater part of the air in the test tube is displaced by hydrogen. Seal off the free end of the outlet tube *B*, disconnect the apparatus from the hydrogen generator, rapidly seal off this intake tube, and shellac the cork to prevent leakage. Whatever oxygen remains in the tube, together with the oxygen emanating from the medium, combines with the hydrogen present until deoxygenation is complete. The combustion that occurs after the tips of the glass tubes are sealed will produce a slight negative pressure in the test tubes.

It has been the experience of the writer that any method of surface plating presents several decided advantages over the deep agar method as a means of the separation of anaerobes. Surface colonies will permit the more ready detection of more than one species of anaerobe should a mixture exist, because there are many of them that produce lenticular colonies in deep agar, yet they will produce very characteristic surface colonies. Furthermore, certain anaerobes are encountered that grow so feebly in agar that their colonies in deep agar are invisible to the naked eye, yet on the surface they produce a spreading film that is readily detected, and contamination therewith can be avoided.

The single-tube method here presented has the advantages over the methods involving the McIntosh and Fildes jar and Smillie's (4) and other modifications of the McIntosh and Fildes jar, in that the single-tube method is far more rapid of operation than the jar methods, also when cultivating a number of dilutions any one culture or dilution can be examined at any time without disturbing other cultures. This is impossible in the use of the several jar methods. By this method the most obligatory anaerobes can be easily grown on an agar surface regularly, and gross mixtures can thereby readily be separated.

It is for the reasons given above that the writer feels justified in recommending the McIntosh and Fildes single-tube method for routine and special anaerobic cultivation.

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The Field Inspection Division and the Quarantine Division of the B. A. I. were consolidated, effective May 1, under the title, Field Inspection Division. This division functions in co-operating with States in the eradication of sheep, cattle and horse scabies, dourine and anthrax. It also has charge of stock yards inspection, including the immunization of swine intended for stocker or feeder purposes, the enforcement of the 28-hour law, the inspection and quarantine of import animals, the inspection and testing of animals for export, the supervision of the importation of animal by-products, the fitting of vessels for carrying export animals, and other matters relating to the protection of our livestock industry against losses from disease.

Dr. E. P. Schaffter, inspector in charge of the meat inspection station at Detroit, Michigan, has been instructed to represent the Bureau at the meeting of the Michigan State Veterinary Association to be held at Detroit, June 28, 29 and 30.

Dr. A. W. Miller, Chief of the Field Inspection Division, B. A. I., has just returned from a trip through the Northwest, where he discussed with Bureau representatives, State officials and livestock owners plans for conducting cooperative sheep and cattle scabies and dourine work during the present season. While in the Northwest Dr. Miller attended the meeting of the Montana Livestock Growers' Association, which was held at Butte, Montana, April 18 and 19, and read a paper on the subject of "Livestock and Animal Disease Outlook."

Dr. Joseph M. Arburua has moved from Hanford, Calif., to San Francisco, Calif., where he and Dr. John McInnes will start in practice, having formed a partnership to take over the business of Dr. E. J. Creely, at 1190 Market Street, San Francisco.

DAVAINEA PROGLOTTINA, A PATHOGENIC CESTODE, IN AMERICAN POULTRY¹

By HOWARD CRAWLEY
Philadelphia, Pennsylvania

IN A CASE REPORT published in the JOURNAL OF THE AMERICAN VETERINARY MEDICAL ASSOCIATION for January, 1922, pages 461-462, by the present author in collaboration with Dr. E. L. Stubbs, attention is called to the pathogenic effects on chickens of roundworms belonging to the genus *Capillaria*. It is further noted that owing to the small size of these worms, and their occurrence deeply embedded in the copious mucus which accompanies such infestations, they are readily overlooked, a microscopical examination of the mucus being required for their detection.

There is, however, another helminth present in chickens which is also pathogenic, very small, causes the secretion of a copious supply of mucus in which it lies embedded, and in consequence its presence will be overlooked unless the microscope is used. This is *Davainea proglottina*, a tapeworm.

It is described on page 47 and illustrated on plates 15 and 16 of Bulletin 12 of the Bureau of Animal Industry of the United States Department of Agriculture. This bulletin was written by Charles Wardell Stiles and Albert Hassall, and was issued July 11, 1896. The account and figures of this tapeworm, however, are copied from an earlier publication by R. Blanchard, 1891, in the *Mémoires de la Société Zoologique de France*, volume 4. At the date on which Stiles and Hassall wrote, this cestode had not been recorded from the United States. But in the "Tœnioid Cestodes of North American Birds," Bulletin 69, United States National Museum, 1909, page 68, Ransom mentions, in a footnote, that *Davainea proglottina* has been collected in Pennsylvania and Maryland.

It is not to be doubted that this helminthiasis is widespread in America, and since it is obviously dangerous, it has been considered advisable to give the clinical symptoms, as these are described in a paper by Lucet, entitled "Entérite vermineuse

¹Contribution from the Bureau of Animal Industry of the Pennsylvania Department of Agriculture. New Series No. 8.

des poules," in the *Recueil de Médecine Vétérinaire*, vol. 65, page 312, 1888. This will permit American poultrymen to recognize the disease when it breaks out, and to take the measures necessary to check its ravages.

Lucet reports two outbreaks of this disease amongst poultry. He states that while at the outset of the attack the birds eat well, they gradually waste away and become lethargic. This condition is followed by more obvious symptoms. The feathers become dull, dry and ruffled up, the wings are drooped, progression is languid, breathing rapid, and the birds no longer run away at the approach of a stranger.

As the emaciation becomes more accentuated there is a fetid diarrhea, the appetite becomes less regular and the rectal temperature falls. Dulness and somnolence become more and more evident, the birds hump up the back and remain for hours in the same position and same place, with the eyes half closed. When they move the gait is staggering and painful, and they are easily caught. The plumage grows duller and dryer, lice become abundant, the crest and mucous membranes grow pale, and finally the appetite is completely lost. In this stage the sick birds yawn frequently, find difficulty in holding themselves upright, and if they fall, are able to regain their feet only with difficulty. A complete torpor finally takes possession of them, and they die without the least evidence of shock. The duration is from one and a half to two months.

At death the emaciation is such that birds may be reduced to one-fourth of what would be a normal weight.

At autopsy, besides the emaciation, conspicuous symptoms are a thickened mucous membrane of the intestine, which may be flecked with red, and the presence of a great quantity of mucus, which tends to be fetid.

In eighteen birds which Lucet autopsied, he found *Davainea proglottina* present in all, in thousands.

With regard to the tapeworm itself, a detailed account is given by Stiles and Hassall in the paper referred to above. According to this the entire worm is from 0.5 to 1.55 mm. long by 0.18 to 0.5 mm. wide. Hence even the largest specimens are only about one-sixteenth of an inch long, and it is easily seen that they may be overlooked unless the microscope is used.

Following the same account, the head is 140 to 250 microns

long by 135 to 200 microns wide. Behind it is often constricted to form a neck. There is a rostrum, the dimensions of which vary according to its state of expansion or retraction. At its base it is armed with a row of from 80 to 90 hooks, 6.5 to 7.5 microns long. The suckers are circular and small, from 25 to 36 microns in diameter, and each is furnished with a single row of hooks, 6 microns long.

The chain is composed of from two to five segments, the first of which is very small, those following becoming rapidly longer and broader. The genital pores are irregularly alternate, and situated in the anterior angles.

The conditions within the segments are noteworthy. In the second the male organs are well developed, the female rudimentary. In the third segment the testes are atrophied, while the female organs are fully developed, except that there is no uterus. In the fourth segment all of the genital organs are atrophied and the entire segment is filled with eggs, which are from 35 to 40 microns in diameter.

The segments have a great tendency to separate, and after doing so may remain in the intestine and gain dimensions of 2.0 by 1.25 mm. or larger than the entire worm.

The intermediate hosts are stated to be *Limax cinereus*, *L. agrestis* and *L. variegatus*. The valid names of these three species of slugs are now *Limax maximus*, *L. agrestis* and *L. flavus*. Although European species, they are all abundant in the United States. *L. maximus* and *L. flavus* are our two commonest large slugs; *L. agrestis* the common small gray slug. Since chickens will without doubt eat any or all of these slugs, there is plenty of opportunity for the bladderworm stage of the parasite to be transferred.

On December 17, 1921, the laboratory of the Pennsylvania Bureau of Animal Industry received four chickens, one dead, three alive. The dead chicken, which was apparently also suffering from roup, showed a severe hemorrhagic enteritis and a large number of small tapeworms. One of the living chickens was then killed and the same conditions were observed at autopsy.

It was unfortunately impossible to obtain a clinical history of these cases, and the second chicken used in the study was unfortunately killed before any clinical observations were made.

The very clear evidence which Lucet furnishes, however, as to the pathogenic effects of *Davainea proglottina*, taken in connection with the diseased state of the intestine found at autopsy, appears to warrant the conclusion that this tapeworm was at least partly responsible for the conditions of which the poultry-man complained.

The two remaining birds, since maintained at the laboratory, are not conspicuously ill, but are being kept in the hopes that they will yield material for inoculation of the intermediate hosts.

The intestinal mucus of the bird which was sacrificed was found to contain three species of tapeworm. These were *Davainea proglottina*, *Amoebolacnia sphenoides* and *Hymenolepis carioca*. The latter two were, however, quite scarce, and may be dismissed from consideration.

With regard, however, to *Davainea proglottina*, in nearly all of the microscopical mounts there were from one to several worms. A mount consisted of only enough mucus to be covered by a seven-eighths inch cover glass. It may therefore be presumed that there were thousands of the worms present in the entire intestine.

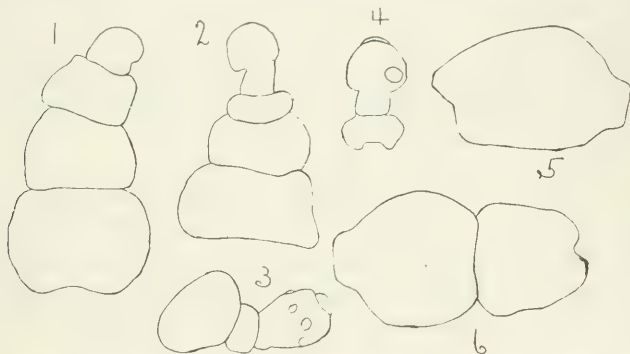
The findings consisted of heads with one or more segments, chains of two or more segments without heads, and single segments. (See figures.) The longest chain found consisted of a head and three segments. It is stated in the literature that the segments are readily detached from the chains, and this was evident from the material examined, for not only were there a great number of free segments, but in many cases the chains themselves were but loosely attached together.

The head (figures 2 and 4) usually was made up of two parts, a broad, rounded anterior portion, and a much narrower posterior portion, which forms at times a very short neck. In some cases this "neck" is as long as or longer than it is broad; in others it is reduced to a narrow transverse strip. In many of the worms, however, this distinction between the anterior and posterior parts of the head is not in evidence (figures 1 and 3).

In six heads measured, the lengths, including the "neck," varies from 186 to 310 microns, the breadth from 150 to 180 microns. These figures are roughly in accord with those given

by Stiles and Hassall, which refer to European specimens of the worm.

The longest chain seen, which consisted of head and three segments, was a trifle less than a millimeter long, and about 420 microns wide at its widest portion. In the chains (figures 1 and 2) the segments were almost always wider than long, there being here a certain discrepancy between the condition as I found it and that figured by Stiles and Hassall.



Camera outlines of *Davainea proglottina*. The chain shown in Fig 1 was 0.8 mm. long.

The segments occurring either singly, or, as it often happened, in pairs, reached a larger size than those in the complete chains. They were, moreover, often longer than broad. Figure 6 shows a pair, the segments of which measured respectively 312 and 314 microns, and 413 by 413 microns. The segment shown in figure 5 was 578 microns long by 363 microns wide.

Although the present paper can not be regarded as making any very original contributions to the science of helminthology, it is believed it may be of value in calling the attention of the poultryman and veterinarian to a condition which may and probably does work harm to the poultry industry of the United States. Where fowls are found to be afflicted with a severe enteritis, parasites, either roundworms or tapeworms, should at once be suspected and should be looked for with the aid of the microscope. It can scarcely be questioned that *Davainea proglottina* and *Capillaria* are widely distributed in the United States, but owing to the small size of both of these worms it is readily seen that the microscope is necessary to detect their presence. The microscope, however, is rarely used in routine

autopsies, and in consequence the worms are almost certain to be overlooked. In consequence, the enteritis which they cause will either be left unexplained or credited to some other cause, and as a result the proper remedial measures will not be applied

Dr. B. H. Ransom, Chief of the Zoological Division, Bureau of Animal Industry, will attend the combined short course for veterinarians and meeting of the Minnesota State Veterinary Association, which is to be held July 12 to 14 at University Farm, St. Paul, Minnesota. Dr. Ransom will deliver one lecture on parasites that affect livestock, and another on the general work of the Bureau.

Upon the death of Dr. C. B. Robinson, who was veterinarian for the city of Washington for a period of thirty years, the position was accepted by Dr. Frederick Grenfell, M. R. C. V. S., one of the oldest practitioners in the District of Columbia.

Mrs. May C. Clark of Springfield, Mass., recently announced the engagement of her daughter, Miss Doris Jane Clark, to Dr. Ralph W. E. Daniels.

Dr. L. A. Klein discussed the subject of "The Sanitary Production of Milk" with the city commissioners, milk dealers, milk producers and others interested, at Corry, Pa., on March 31.

Commissioner H. H. Halladay, well and favorably known to most of our readers, has resigned as State Commissioner of Agriculture for Michigan to become Secretary of the Michigan Agricultural College. The change was effective on April 1, the same day that Professor David Friday formally took over the presidency of that college.

Dr. Frederick Torrance and Col. Sharman, of the Canadian Health of Animals Branch, spent several days in Washington, D. C., last month conferring with officials of the Bureau of Animal Industry.

ENTEROCLYSIS ¹

By WILLIAM J. LENTZ

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ENTEROCLYSIS, or the flushing out of the bowel by means of large and slowly injected clysters, is one of the most valuable therapeutic measures we possess. It is not my purpose to enumerate the diseases and conditions in which I feel it is indicated as a part of the routine treatment, but rather to consider the subject in a general way. Some of the following facts bearing on enteroclysis have been proved by actual experiment at the Veterinary School of the University of Pennsylvania.

Enteroclysis is of value for medicating or cleansing the large intestine; for the maintenance of bodily heat by the use of hot water; for the reduction of fever by the use of cold water; an absolutely safe method for combating circulatory failure; for stimulating kidney secretion, thus promoting elimination of poisons; induces intestinal absorption of water when the body craves it; dilutes the poisons manufactured by the germs of disease; prevents collapse; washes from the body various impurities circulating in the blood and lymph; supplies the body with liquid when the stomach will not permit the liquid to be swallowed; frequently aids in the diagnosis of intestinal parasitism; a means by which, in the dog, it is sometimes possible to remove foreign bodies, by way of the mouth, from the intestines, stomach, esophagus and throat; primarily indicated in intestinal obstructions and fecal impactions.

The advantage of enteroclysis over venous infusion in septic conditions lies in its safety. When the heart muscle is weakened by septic and febrile processes it is dangerous to increase suddenly the blood pressure. The absorption of fluids from the intestine can only be slow and gradual and no more can be absorbed than the organism craves. No matter how far the liquid penetrates, the entire gut may profit by the lavage by bringing down the contents from the small intestine, as the value of irrigation depends somewhat upon the absorption of water by the large intestine.

¹ Presented at the thirty-ninth annual meeting of the Pennsylvania State Veterinary Medical Association, Harrisburg, Pa., January 24 and 25, 1922.

The best apparatus for bowel irrigation in the dog is a long, flexible tube and a fountain or gravity syringe. In the horse, a one-half or three-quarter inch flexible rubber tube, esophageal tube or garden hose attached to a bucket or tank of sufficient size so that the flow will be constant, not intermittent. In cities or towns the attachment may be made to a forced water supply.

When it is desired to cause liquids to pass forward to any extent it has been found that any kind of forced hand syringe is, as a rule, of little value, because the fluid is injected with a jerking instead of a constant flow; and furthermore, the pressure at the start of the injection should be so slight that the flow would amount to hardly more than a trickle, increasing the pressure as the resistance of the bowel is overcome by simply elevating the container or turning on the tap further.

Liquids exert pressure uniformly in all directions. In the gravity syringe the liquid is urged on by the hydrostatic pressure which is exerted uniformly in all directions irrespective of the caliber of the tube; therefore the diameter of the tube makes no difference other than that the liquid flows more rapidly with a tube of greater diameter. The fountain syringe held at the height of one foot represents approximately one-half pound pressure to the square inch. It has been asserted that pressure in excess of eight pounds to the square inch may bring about rupture of the peritoneal coat of the bowel. We have experimentally exceeded this pressure in both the horse and the dog without such a result. Frequently in the dog a pressure of but two pounds will cause the liquid to pass the ileo-cecal valve, thence into the stomach and then from the mouth, because the ileo-cecal valve is not very efficient in this animal. A pressure in excess of eight pounds is dangerous, particularly if any disease of the bowel exists, and we have been able to show, in the dog, on a number of occasions minute points of hemorrhage of the bowel when pressure even under eight pounds is used, and when too rapidly and forcibly made. There is also grave danger of collapse at times.

Bowel irrigation to be effective should always consume considerable time. Frequently repeated forcible injections, using small amounts of water, simply tend to produce spasm of the bowel. An interval of from four to eight hours should elapse before the second irrigation is attempted.

The amount of liquid employed is not to be measured by quarts but by results. In puppies, in particular, the best guide as to the amount which has been introduced is the tension of the abdominal walls. I take this opportunity to call attention to a case of intussusception in a puppy which was relieved by enteroclysis, the diagnosis having been established by laparotomy.

The temperature of the liquid injected, in most instances, should be about 100 degrees to 110 degrees F. Cold irrigations have a tendency to depress the heart and may produce dangerous chilling of the internal organs. If water at a temperature of 65 degrees F. is used it will bring about a fall in the bodily temperature of from one and one-half to three degrees in fifteen to thirty minutes. It is therefore indicated at this temperature to reduce fever. If the temperature of the water is too high there is danger of heat stroke. A temperature of 115 degrees F. will cause a rise of from three to four degrees in from twenty to thirty minutes, and injections at this temperature are frequently given to patients brought to us with a subnormal temperature.

There is always danger, when large injections of water are used, that the vital salts may be abstracted from the intestinal wall; the liquid, as a result of osmosis, passing into the tissues thus in a sense drowning them; therefore, to guard against this it is always advisable when possible to use a normal saline solution, 1 dram to the pint. Water in itself is irritating to the bowel.

With the idea of ascertaining how far liquids could be made to pass forward in the horse, a number of experiments, using methylene blue injections, were undertaken, the animals being destroyed afterwards. In general, our findings corroborate those of Reek in his work on "Colics of the Horse," to which I would refer you for the technic employed in obstruction colic. The experiments proved to us rather conclusively that the irrigations as usually carried out by the busy practitioner, or the layman, with forced hand-pumps or other inadequate apparatus, an insufficient amount of water, an intermittent flow, too great pressure at the beginning, too short a time devoted to making the injection, etc., can not be very effectual in breaking down impacted feces at the usual seat in impaction colic—that is, the

terminal part of the folded or large colon. Usually such irrigations seem to embrace but four to five feet of the floating or small colon, even when, in one instance, for example, the animal received three ounces of chloral in advance, so as to simulate a case of impaction colic. In one experiment the animal received a purge some twelve hours before the injection was made. A large amount of liquid was retained, the time consumed being about fifteen minutes; and it was found, in this case, to have passed into the folded or large colon as far forward as the pelvic flexor.

Several facts in these experiments worth recording are: That the liquid will pass farther forward if the lower bowel is empty; that it is advisable to have the posterior part of the body elevated, the higher the better; that it takes more than twice as long to make the injection with cold water as when water at body temperature is used; that there appears to be less straining, consequently more liquid retained, when salt in proper amount to make a normal saline solution, or Epsom salt in five to ten per cent solution, is added to the water.

Medication of the bowel, particularly of the dog, or, in other words, treating the intestinal mucosa by rectal injection, sometimes gives very gratifying results in many cases of diarrhea, intestinal coccidiosis (previously reported on in intestinal coccidiosis in cattle, which responded to this line of treatment), proctitis, inflammation of the prostate, etc. One of the best solutions to employ is tannic acid in the proportion of 1 to 5 drams in 2 quarts of water, with about an ounce of tincture of opium, boric acid, or bicarbonate of soda. As a matter of fact the passage of mere normal salt solution over the bowel is of value to remove the mucus and pus and dilute the toxic albuminoids produced by the microorganisms. It is asserted that tannic acid inhibits the growth of intestinal germs. Nitrate of silver injections of the strength of 10 to 20 grains to the pint of water is often efficient in old and chronic ulcers of the bowel. This should be followed by a saline solution to limit the action of the silver. Boric acid solution is employed in the proportion of one dram to the pint of water.

I can not leave this subject without calling attention to nutrient enemata. Recent investigations have proved conclusively that injections of foodstuffs per rectum for the purpose of main-

taining nutrition have but little value, the solids remaining in the bowel, only the liquids being absorbed, and these are of no value whatsoever unless first predigested. To a well-beaten egg and milk a peptonizing tablet or contents of a peptonizing tube must be added. The addition of whisky or wine will increase the effect. Five ounces of scraped meat suspended in 3 ounces of lukewarm water to which is added a peptonizing or pancreatic tablet may be employed. Milk, 2 ounces; strong beef tea, 2 ounces; yolk of 1 egg, 1 peptonizing tablet.

A nutrient enema should be given warm and slowly. The effect may be increased by the addition of whisky or wine. It should not be given more frequently than every six hours, as the rectum is apt to become irritable. The same mixture should not be repeated too often.

Dr. J. L. Masson, formerly of Myrtle Point, Oregon, is now located at Eureka, Calif., where he will continue the practice of his profession.

Dr. D. W. McAhren, Sioux City, Iowa, Dr. Robert Rives, East St. Louis, Ill., S. M. Magowan, Fort Dodge, Iowa, S. F. Cusaek, Sioux City, Iowa, G. H. Williams, Omaha, Nebr., and Edw. M. Boddington, Kansas City, Kans., were recent visitors at the National Capital, where they conferred with Government officials on subjects of mutual interest, as a committee of the Associated Serum Companies.

British farmers, it is said, are abandoning the motor tractors and trucks that they bought during the war, and are reverting to the use of horses. The secretary of the National Farmers' Union is quoted as saying that farmers are looking forward to a general return to the horse-drawn heavy vehicle and an early revival of the horse-breeding industry.

BACILLUS BOTULINUS IN SWINE DISEASES

By ROBERT GRAHAM

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THE PRESENCE of *Bacillus botulinus* as a secondary invader in swine diseases and the possibility of its being a factor in the immunization of swine against hog cholera as the result of contaminated serum or virus was reported in the October (1921) issue of the JOURNAL OF THE AMERICAN VETERINARY MEDICAL ASSOCIATION. Since the above preliminary report the writer has had an opportunity to continue these investigations with special reference to the anaerobic flora in the internal organs and intestinal tract of swine affected with cholera ten to ninety days following immunization with serum and virus, as well as to examine certain samples of serum and virus secured at random from manufacturers of serum, for the presence of heat-resisting, spore-forming organisms.

In two afflicted herds referred to the laboratory since the original report the presence of *B. botulinus*, type A, has been encountered in the intestinal tract and internal organs of swine which suffered from cholera following the injection of serum and virus. Notwithstanding the relative resistance possessed by mature swine to the botulinus organism the specific toxic character of the A-type botulinus toxin in pigs has been observed in experimental animals following the injection of broth cultures. The syndrome of an acute intoxication is typical and easily recognized, yet the subacute or chronic type of the disease, as clinically observed in experimental pigs, is marked by debility and unthrift.

Since the original report relative to the positive bacteriological findings in serum and virus, negative results have been encountered in approximately 100 samples of commercial serum and virus as secured in the open market and it appears that botulinus intoxication in swine as a specific factor in "breaks" may not be as significantly related to the contaminated serum and virus used in immunizing the herd as inferred in the earlier part of our studies.

CLINICAL AND CASE REPORTS

(Practitioners and others are invited to contribute to this department reports of unusual and interesting cases which may be helpful to others in the profession.)

OSSIFYING PERIOSTITIS IN A BULL

By LEE M. RODERICK

North Dakota Agricultural Experiment Station, Agricultural College, North Dakota

CASUAL REFERENCES in the literature as well as the experience of practicing veterinarians indicate that conditions involving the stifle and the bones there articulating are occasionally observed in cattle. That such affections are of especial significance in valuable breeding animals and particularly in bulls is quite apparent. This article is not concerned with a clinical discussion of the condition, but rather with a general pathological study of the bones involved in a case of about three years' duration. It is hoped that these general observations may have some worth as an indication for the care and treatment of such animals.

History.—The affected bull was of the beef type, seven years of age, had at all times been well fed and cared for, and had been lame in both hind legs for about three years. The left stifle was the more sensitive and the left leg was always a little larger at times of greatest lameness. There was no evidence of heat, although pain could be induced in the region of the external ligament. There is no obtainable history of external trauma or mechanical injury. Treatment in the latter stages has included salicylates, potassium iodide, and colchicum combined with local hot applications.

The question of exercise in similar conditions may be worthy of consideration. This animal had at one time run in the pasture for a period of about three months and in the meantime had become greatly emaciated, yet the feed was never insufficient. The owners were then prevailed to place the animal in a well-bedded box stall, and following such treatment as given, some improvement was obtained. The animal later fell while in the act of service, and inasmuch as prognosis appeared very unfavorable as the result of some undetermined injury, the bull was accordingly destroyed.

The clinical observations concerned in this case are the work of Dr. H. C. Vestal, Page, N. Dak. He found the joint capsule to be hyperemic and the synovial fluid of a dirty reddish brown color. The femur and tibia were removed and boiled to remove adherent tissues, and were then submitted to this laboratory. The bony fragments shown in the illustration were loose after the bones were boiled, and since care was exercised



Stifle Joint of Bull

in handling to avoid injury, it is probable that they were at least only loosely attached.

Examination of the femur shows the presence of extensive superficial bone lesions. These consist of irregular porous masses, plates and spicules termed osteophytes which in places attain the thickness of a centimeter. The prominent prolifera-

tive changes involve the trochanter major, the distal portion of the shaft, where the changes are the most marked, and the distal extremity. With the exception of the internal condyle there is little involvement of the articular surfaces except at the borders. Section of the femur did not reveal any evidence of a rarefying osteitis. Except for the extensive superficial lesions, the bony structure appears normal.

The lateral borders of the patella exhibit coarse osteophytes, yet the articular surface is but little injured. The anterior surface is roughened to a marked degree.

The periostitis appears to have been confined mainly to the shaft of the tibia and to have involved the proximal portion more severely. The medial surface is greatly roughened by the presence of numerous osteophytes. The posterior surface was but little involved except adjacent to the proximal extremity. The proximal extremity presents numerous roughened protuberances about the borders of the condyles. The pathological condition has made some encroachment on the articular surface, but more especially on the medial border. The intercondyloid fossæ and the proximal head of the fibula show additional bony masses.

Examination of these bones indicates that they have been affected with a generalized periostitis which was most severe adjacent to the stifle joint. The ossified lesions confirm the chronicity of the condition. Chronic periostitis often becomes proliferative in nature, resulting in the formation of new bone from the inner layers of the periosteum. The histological process of such bone formation is similar to that normally developed, but because the blood vessels are irregularly arranged, as in the formation of granulation tissue, and subject to various mechanical and nutritive changes, the new bone is not regularly arranged in lamellæ but in irregular masses.

PUSSY'S PERILS

By E. A. WESTON

Rubiaco, Western Australia

MY FIRST INTRODUCTION to Pussy was when she started to call tentatively. She was very thin, evidently finding the world a tough place to get a living in, but she had an ingratiat-

ing manner and was evidently a good judge of character, as she made herself specially pleasant to my wife, who is a great lover of animals. Finding she had struck a good home, she finally settled down here permanently, much to my annoyance, as there was every indication of an increase in the feline population. I stipulated that my wife should do the bloody deed when the kittens arrived, but needless to say it fell to my lot, and I drowned four out of the five new arrivals.

Nine days after the birth of this lot, Pussy went on the razzle-dazzle again, and got a fresh lot under way. As it looked to me as though the supply was likely to largely exceed the demand, I decided that Pussy should have her ovaries out. However, I had to wait until No. 1 kitten was ready to wean, and by this time Pussy was half gone in pregnancy again. Having been out of practice for some years owing to invalidity, I took my patient along to Mr. T. Dewhirst of this city (Perth, Western Australia), and we operated on her in his hospital.

The day previous to the operation I shaved and disinfected the abdomen, and it was painted with iodine while the patient was on the table. For an anesthetic we gave one-quarter grain morphia hypodermically, followed by chloroform. I had shut Pussy up on the morning of the operation, and on opening her up we found that this was a great mistake, as her bladder was very distended and obscured the field of operation. However, under chloroform the sphincter relaxed, and we were able to go ahead. The uterus contained four fetuses, and of course there was the usual muscular and circulatory development accompanying pregnancy. The ovaries were removed without difficulty, and a small lateral from the main uterine vein, which was bleeding freely, secured and ligatured. Following this the abdominal wound was stitched, the muscles and peritoneum with a continuous gut, and the skin with interrupted silk sutures. Pussy was put back in her box and brought home in the trap.

The following day she was moved out into the garden under a portable chicken coop. She immediately got out of her basket and emptied her bowels, following which she dozed all day. The second day signs of abortion, in the form of a bloody oozing from the vagina, appeared, and on the third day increased. I passed a finger into the vagina to try to find out what was

happening, but Pussy yelled blue murder, and struggled so violently that I had to desist, fearing she would burst the abdominal wound open. On the fourth day Pussy drank some milk, and aborted four kittens with their membranes. Two came away in the morning, but she held the others until she was let out, and allowed to go and scratch a hole in her usual spot in the yard. The following day I syringed her out with a bit of rubber tube on the end of a 10 c.c. hypodermic syringe, and I used this occasionally for some time thereafter. She drank some milk, cleaned herself, and seemed bright, although very weak.

During the next three days signs of septicemia were present, the patient refusing to touch either food or drink of any kind, and getting very weak. She was, however, surprisingly bright, and on the ninth day my wife, who had taken a great interest in her protégé, started feeding her with egg and milk. Within a few days her condition began to improve, and she made an uninterrupted recovery, and ate her first solid food eleven days after the operation. On the seventeenth day her kitten started sucking her again, although it had been nearly weaned before the operation. It continued sucking her up to a few days ago, a period of nearly three months since the operation. The abdominal wound never gave any trouble, and healed by primary adhesion.

I have recorded this case because it stresses the importance of placing an animal like the dog or cat under natural conditions prior to and succeeding operation. Had Pussy been shut up in a strange place there is no doubt she would have refused to pass either urine or feces until compelled to do so, and would also have retained the dead fetuses until the last moment. This would most probably have resulted fatally, despite the actual operation having been successfully performed.

OVERLOADING OF HORSE'S BOWELS WITH CORN ¹

By R. A. DEAN

St. Peter, Minnesota

A BAY GELDING, ten years old, running loose in the yard, broke into the corn crib during the night and ate between 60

¹ Presented at the annual meeting of the Minnesota Veterinary Medical Association, St. Paul, Minn., January 13-14, 1922.

and 100 ears of corn. He was found sick by the owner in the morning and the broken corn crib discovered. Ward's liniment was given and the dose repeated. This did not seem to help, and I was called.

I saw the patient at 11 a. m. As I got out of my car I spied the patient rolling out in the yard near the straw pile. When I got over to it I found him in great distress; food coming from nostrils; respiration fast and jerky; conjunctiva inflamed; pulse bounding; ears and legs warm; temperature 102; abdomen greatly enlarged from gas and food. I at once passed a trocar, and a lot of gas escaped, but the swollen abdomen did not go back to normal, nor anywhere near normal, so I knew it was the solid or semisolid fermenting mass that I would have to get rid of. I administered physic, one ounce of salicylic acid in a capsule, and massaged the bowel per rectum.

There had been, the owner said, and were now, free fecal passages. The animal was now somewhat relieved and stood on its feet, occasionally pawing and looking around at its right side. I administered a second capsule of salicylic acid and left choral hydrate to be given every hour until I could see the case again, which I did at 3:30 p. m.

I found the animal up but still in some distress. Administered another dose of physic and put him on nux vomica and gentian after giving salicylic acid and again massaging bowel. Left instructions to call me if he needed me again, and left the place, thinking the horse could not recover.

I saw the owner's neighbor the next day, who informed me that the horse was still up and doing better, but that he would not eat. Two days later I learned that owner had driven the horse to town.

I cite this case in view of the controversy recently in *Veterinary Medicine* waged between Drs. Quitman and DeVine regarding the use of salicylic acid and the stomach tube. I did not use the stomach tube in this case because the ingesta, or at least most of them, had passed from the stomach, and therefore flushing of the stomach could do no good. I did not have much faith in what medicine could do for this horse, either, but gave what I considered the rational treatment, and, as I said before, was surprised at the results because I thought it a case of sure death, and from the owner's talk I think he did, too.

I do not believe the stomach tube is indicated in any cases except gastric tympany and gastric engorgement (except, of course, poisoning). In fact, the stomach tube is the only remedy that will save a case of stomach overloading or engorgement, and Dr. Quitman's salicylic acid and any and all other medicaments are absolutely of no avail whatsoever for this reason: Medicine would never get a chance to act, for to pour medicine into an impacted mass in the stomach would be like pouring it into a sack full of bran; it would soak down a little way into the mass and never reach the sides at all. This is the only case where a stomach tube is absolutely needed to effect a cure, so, while perhaps a common country practitioner is taking a lot upon himself to criticize such men as these, I believe they are both right to a certain extent and wrong the rest of the way, if you know what I mean.

We have a fine list of colic remedies which, with rectal massage, will relieve other colics that are susceptible to any treatment.

CÆSARIAN OPERATION ON A BITCH¹

By R. A. DEAN

St. Peter, Minnesota

A CÆSARIAN OPERATION, with delivery of fetus by cutting through the walls of the abdomen, was performed by me November 26, 1921, after all other means of delivery had failed, on a registered Boston bull terrier bitch of much value.

The animal was anesthetized with chloroform and ether (2 of ether, 1 of chloroform). The field, the right flank, was clipped, shaved and sterilized. The incision through skin, muscles and peritoneum was made, exposing the uterus. All bleeding was checked and the uterus was carefully taken out and laid in sterile gauze. An opening was made in the left horn and two live puppies were extracted, the last one giving great trouble owing to the fact that its head was pressed firmly into the pelvic opening.

There was quite a little bleeding from the uterus, which

¹ Presented at the annual meeting of the Minnesota Veterinary Medical Association, St. Paul, Minn., January 13-14, 1922.

took some time to check, and part of the afterbirth did not come away. This was left.

The edges of the uterus were inverted and sewed with an uninterrupted catgut suture to the other end of the wound and back again to the starting point, where it was tied, the suture penetrating only serous and muscle coat. The peritoneum was then sutured with interrupted catgut; the muscles and skin with interrupted linen. The walls of the vagina were then painted with 1-1,000 adrenalin solution and two suppositories of capsule containing two-thirds boric acid and one-third iodoform placed therein.

This treatment was repeated once a day for three days, during which time the mother was very sick, beginning to improve on fourth day, from which time on she made an uneventful recovery.

The puppy which had been stuck within the pelvic opening died the third day from swelling of its jaws, due to wounds made by instruments first used in delivery to such an extent that it could not take sufficient nourishment. The other puppy lived and was sold for \$40. The mother has since given birth to a litter of pups.

I cite this case to show the value of actual surgical demonstrations at our meetings, as I learned this technic from Dr. Gould's demonstration on a sow two years ago at University Farm. I have also saved several sows with this technic.

A committee has been appointed to erect a monument at Lyons, France, to the late Prof. J. B. A. Chauveau, a famous French scientist and authority on comparative medicine, who died five years ago in his ninetieth year.

The French National Syndicate of Veterinarians has adopted an official label or stamp to be used on approved products. The design bears a portrait of Bourgelat, the father of modern veterinary science. The proceeds are to be applied toward a home for needy retired veterinarians. The Syndicate has voted to continue for another year its aid to veterinarians in the devastated regions.

ABSTRACTS

CONTRIBUTION TO THE ETIOLOGY AND VACCINOTHERAPY OF CANINE DISTEMPER. Mazzucchi. *Clinica Veterinaria*, nos. 13 and 14, 1921. Abst. in *Rev. Gén. de Méd. Vét.*, vol. 31 (1922), no. 362, p. 78.

After many bacteriologic examinations with negative results in cases of dog distemper, Mazzucchi isolated a coeco-bacillus from the liver of a dog showing clinical symptoms of the disease, which possessed characters very similar to those of the organism found and described by others in cases of the disease (*B. bronchisepticus*).

He inoculated 5 dogs intravenously and subcutaneously with two loops of a broth culture of the organism; all animals developed the same clinical symptoms as occur in the natural infection—*i. e.*, fever, cough, watery eyes, and after several days pustules on the inner aspect of the thighs. A small dog which was living with these animals contracted the same disease.

Two dogs inoculated with the same germ, together with streptococci and staphylococci, showed the same clinical picture but with more marked symptoms. Autopsy revealed the same lesions as those found in the natural infection. The author did not look for the cellular inclusions described by Lenz and Sinagallia. Streptococci and staphylococci which are frequently found in the different secretions of the sick animal without doubt play a very important part in the production of secondary lesions.

He prepared a polyvalent vaccine with a view to testing its therapeutic action. The results were negative in dogs affected with the nervous form of distemper, no doubt because there already existed anatomic lesions.

In the beginning of the disease the injection of the vaccine in a dose of 2 c.c. prevents the appearance of cutaneous lesions. When the symptoms persist, the injections may be repeated two or three times at an interval of 2 or 3 days.

The encouraging results obtained in the treatment should recommend the use of the vaccine in the prophylaxis of the infection.

L. T. GILTNER.

THE FORMATION OF ANTIBODIES FOLLOWING INJECTIONS OF MALLEIN. Brocq-Rousseu, P. Forgeot and A. Urbain. *Annales de l'Institut Pasteur*, vol. 35 (1921), No. 12, p. 879.

From experiments on ten normal horses and two glandered horses the authors formulate the following conclusions: 1. The intradermic injection of one-tenth c.c. mallein (1:4) repeated four times at regular intervals caused the formation of antibodies in only two out of five cases, or 40 per cent. 2. The first subcutaneous injection of two and one-half c.c. mallein (1:10) caused antibodies to appear in the blood of four out of five horses, or 80 per cent. After a second injection antibodies appeared in all cases. 3. The horses in which antibodies were not demonstrated after four successive palpebral malleinizations did show them four days after a subcutaneous injection of mallein. The dose of mallein injected subcutaneously was ten times greater than that of the first (intradermic) injections. 4. The antibodies formed in the organism after either the intradermic or subcutaneous malleinization appear from the fourth to the eighth day after the injection of mallein. They all disappear after the forty-fifth day. 5. In glandered animals the amount of antibodies in the serum is notably increased after injection of mallein.

From a practical point of view the following conclusions are drawn: If the complement fixation test is to be used in connection with mallein for the diagnosis of glanders blood ought to be drawn immediately after malleinization and in any event before the fourth day or at least 45 days after injection of mallein. Obviously, the blood should be drawn the day before the injection of mallein; but it may be taken the day after in case the mallein test should give a doubtful reaction; generally such reactions necessitate a fixation test. L. T. GILTNER.

THE IMPORTANCE OF THE DOMESTIC ANIMALS IN THE SPREAD OF TUBERCULOSIS. Lydia Rabinowitsch-Kempner. *Zeitschr. f. Tuberkulose*, vol. 34 (1921), no. 7, p. 570.

In the transmission of tuberculosis, the infection from one person to another is of most frequent occurrence. Cattle are next in importance, as the studies of the last 20 years have shown that bovine tuberculosis in children is by no means inconsider-

able. The dog and cat as intermediate carriers of tuberculosis infection constitute a danger to the health of man which must not be estimated too lightly. Besides these animals, swine are frequently affected with tuberculosis. The other domestic animals, such as the horse, ass, sheep, rabbit and guinea-pig, are only rarely affected with the disease, even when they come in contact with tuberculous humans and cattle. The parrot and canary bird are not only susceptible to the avian germ, but also to the human and bovine bacilli.

In the years 1913-14, Jost autopsied 4,683 dogs and 933 cats at a Berlin rendering works. Of the former 75, or 1.6 per cent, were found tuberculous; no dog under 2 years old was tuberculous and the highest percentage of infected animals was found in those aged from 5 to 10 years. Of the latter class of animals 110, or 11 per cent, were tuberculous; the most cases were found in the cats ranging from 4 to 6 years.

In 1920-21 Jost examined 771 dogs and 34 cats. Suspected tuberculous material from the animals was turned over to Rabinowitsch, who made bacteriologic examinations, with the following results: 19 strains of tubercle bacilli (2.4 per cent) were isolated from the dogs. Of these strains 16 were human, 1 bovine and 2 atypical. 5 strains (14.7 per cent) were recovered from the cats, 3 human and 2 bovine. Two specimens of goat lung were also examined, bovine bacilli being recovered from 1 case and no tubercle bacilli from the other.

From the above figures the author concludes that tuberculosis in both the dog and cat is decidedly on the increase.

L. T. GILTNER.

PREPARATION OF BRAXY VACCINE. M. Christiansen. Den Kongelige Veterinaer Og Landbohøjskole Aarsskrift, 1921, p. 75.

Braxy vaccine consists of a mixture of braxy spores and braxy immune serum so standardized that each dose for a sheep contains a surely fatal dose of braxy spores for a 250-300 gm. guinea-pig (usually 8 mgms.) and an amount of immune serum not quite sufficient to neutralize the virus. The immune serum is prepared by inoculating horses intravenously with increasing doses of fresh broth culture of the braxy bacillus (*B. gastromycosis ovis*). The serum is exsiccated and pulverized and

in this condition it will retain its potency for years. The braxy spores are obtained by cultivating the organism in a medium composed of equal parts of glucose-free broth and sterile normal horse serum at 37 degrees C. under anaerobic conditions (hydrogen). After two weeks incubation the cultures which then contain large quantities of spores are dried and pulverized and as such are used for the vaccine.

During the past 10 years the vaccine has been used each year on from 200,000 to 250,000 sheep in Iceland and on about 10,000 sheep in Faroe islands with satisfactory results.

L. T. GILTNER.

A CASE OF TUBERCULOSIS IN THE GOAT. Geo. Simons. The Veterinary Journal, vol. 78 (1922), no. 1, p. 23.

A 3-year-old purebred white Anglo-Nubian goat, which had suffered no previous illness, became very dull and anemic two or three weeks after a normal parturition. There was no cough or enlargement of the superficial lymph glands. The condition gradually became worse and diarrhoea set in, becoming in a short time very profuse. The abdomen became somewhat pendulous and on the right side a peculiar lumpy condition was faintly discernible amongst the bowels. The animal failed rapidly and was destroyed. At autopsy the mesenteric lymph glands were found enlarged and softened and contained thick creamy pus. Laboratory examination of the glands showed them to be tuberculous. No other lesions of tuberculosis were found.

L. T. GILTNER.



REVIEW

DAIRY BACTERIOLOGY. Orla Jensen, Ph. D., Professor of Technical Biochemistry in the Polytechnic College, Copenhagen. Formerly Director of the Swiss Experimental Dairy Station. Translated from the Second Danish Edition, with Additions and Revisions by P. S. Arup, B. Sc. (Lond.), F. I. C., Chief Chemist to English Margarine Works (1919), Limited. Published by P. Blakiston's Son & Co., Philadelphia, 1921.

This is a book of 174 pages of subject matter, interspersed with 70 excellent illustrations. It is divided into two parts. The first part includes 53 pages dealing with a general discussion of microorganisms, their classification, biology, and method for their culture and identification. The author gives in condensed form a good general picture of microbiology and utilizes in his text only those organisms which are concerned in dairy practice.

Part 2 deals directly with milk and its products and covers practically the whole field of organisms concerned in normal and abnormal changes. Very good chapters are found on sanitary measures for handling milk, preservation of milk by pasteurization and other methods, lactic acid fermentation, normal and abnormal microflora of butter, ripening processes of the different cheeses, defects of cheese, and grading of milk.

The book should be of great assistance to the veterinarian, dairyman, and all workers with milk and dairy products. It is concise and comprehensive, containing all the essential facts of the subject and sufficient references for those who wish to go deeper into any particular matter. It represents the author's conception of the requirements for a textbook on the technic of dairy bacteriology and is based on his experiences during twenty-five years of research work. Prof. Orla Jensen is an authority on the subject and his book is a standard textbook for Danish students of dairying. It has been translated into German, Dutch and Finnish and has met with marked success.

The translator is to be congratulated for the excellent manner in which he has performed his task. The easy and not too technical construction of the text makes its reading interesting and understandable to the layman as well as the student and others associated with the dairy industry.

B. A. G.

ARMY VETERINARY SERVICE

ARMY HORSE BREEDING

The World War made such a heavy drain upon the stock of horses in the United States, which supplied many thousands of animals to the American and allied armies, that all the encouragement possible should be given by the Government to plans for replenishment and improvement of breeds. The protest made by the Association of American Horse Shows against the proposal, which has been heard in Congress, for curtailment of the appropriation for the remount service of the army and the abandonment of the remount depot at Front Royal, Va., is based on sound consideration of the economic value of the work which the military establishment has been doing—a work essential not only to the army, but in the last analysis to the farming industry.

At Front Royal is located the only remount depot in the East or South, and it is highly desirable that it should be maintained. Its favorable situation renders it peculiarly adapted to the breeding of the best types of horses. It is a long-established station and represents an investment which should not be sacrificed. Of the four remount stations maintained by the army, it is probable that the depot at Fort Keogh, Mont., could best be spared, and in the interest of economy it is not unlikely that the army would agree to its abandonment, since this station is located very far North, in a part of the country where the climate is exceedingly severe for a considerable part of each year. The Front Royal depot is ideally located, and the splendid work which is being accomplished there should not be interrupted.—*Washington Post*.

Dr. R. G. Lawton, connected with the U. S. Army remount breeding work at Lexington, Ky., stopped off at the National Capital, on his way to the New England States, where he will spend his vacation.

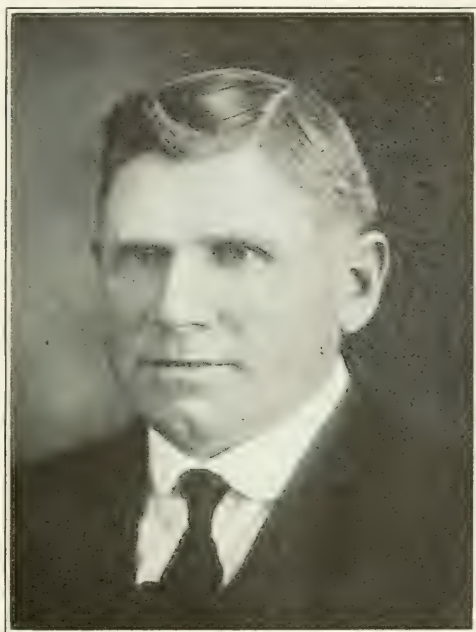
The enrollment of students in German veterinary schools is given as follows: Hanover, 387; Berlin, 276; Munich, 220; Dresden, 209; Giessen, 169.

ASSOCIATION NEWS

ANNUAL MEETING, A. V. M. A.

The fifty-ninth annual meeting of the American Veterinary Medical Association will be held at St. Louis, Mo., August 28 to September 1, 1922.

Make your plans to go.



Dr. Burton W. Conrad of Sebeetha, Kansas, recently elected to the Executive Board of the A. M. V. A. to represent the Sixth District.

A. V. M. A. CLINIC AT ST. LOUIS

It has been some time since the American Veterinary Medical Association has attempted a clinic and the change in the character of practice has led to a different situation in the matter of presenting clinic before a large association. In the past attempts at clinic have been unsatisfactory because of the inability on the part of the operator or demonstrator to perform the operation in such a manner that more than a few could obtain any benefit from it.

Dr. Kinsley has realized that conditions have changed to such an extent that many factors of interest may be presented before such an organization, and an effort will be made at the St. Louis meeting to renew the practice of presenting clinics before the A. V. M. A. It is to be hoped that every practitioner will gain something from this demonstration that will repay him many times over for the time and the expense attached to attending such a meeting.

At the present time, those working upon this program are very hopeful and believe that the program as arranged will interest and please the practitioners of the Association. The following is a tentative program as it appears at this time. Minor changes or additions may be made later. A special clinic will be held for those interested in small animal practice and will be in charge of Dr. Flynn of Kansas City:

Clinic Program

First Day—Forenoon—

8:00— 9:30	Genital Organs.....	Boyd
9:30—10:30	Tuberculin Reactors	Luckey
10:30—12:00	Sterility	DeVine

Afternoon—

1:00— 2:30	Poultry	Kaupp
2:30— 3:30	Sheep	Newsom
3:30— 5:00	Parasites of Sheep and Hogs.....	Hall

Second Day—Forenoon—

8:00— 9:00	Surgey of Udder.....	Ferguson
9:30—10:00	Cholera	Schwarze

Afternoon—

1:00— 2:30	Tuberculous Lesions	B. A. I.
2:30— 3:00	Horses	Merillat

MICHIGAN VETERINARY MEDICAL ASSOCIATION

At our annual meeting in February our association voted to hold a summer meeting at East Lansing in conjunction with the State Department of Agriculture, the local branch of the Federal Bureau of Animal Industry and the Veterinary Department of Michigan Agricultural College. President Wurm has named the committees that are to have active charge of the arrangements for the big meeting. The chairmen of these committees are: Committee to Represent the Association, W. N. Armstrong, Concord; Committee to Represent the State Department of Agriculture, the Federal Bureau of Animal Industry, and Veterinary Department, Michigan Agricultural Col-

lege, B. J. Killham, Lansing; H. M. Newton, Lansing; F. W. Chamberlain, East Lansing; Clinic Committee, J. P. Hatton, Lansing; Entertainment Committee, O. A. Taylor, East Lansing; Ladies' Committee, Mrs. J. P. Hutton, Lansing.

A few days ago President Wurm called a joint meeting of all the committees in Detroit, and it was decided to hold the summer meeting the last three days of June. The first day is to be designated "Clinic Day," the second "Practitioners' Day" and the third "Scientific Day." The clinic committee will have charge of the program for the first day, the committee representing the association the second day, and the committee representing the State Department of Agriculture, the Federal Bureau of Animal Industry and the Veterinary Department of Michigan Agricultural College the third day.

The Entertainment Committee and the Ladies' Committee will provide the fun and frolic for the occasion. But to make the meeting a success we must have the things you are interested in. A questionnaire has therefore been sent to each member, which if filled out carefully and thoughtfully will aid the committees greatly in making up the kind of program wanted. Of course it may not be possible to get everything one desires, but we feel safe in saying that we can get what the majority want.

R. A. RUNNELLS, *Secretary*.

SOUTHEASTERN MICHIGAN VETERINARY MEDICAL ASSOCIATION

The annual meeting of the Southeastern Michigan Veterinary Medical Association was held in Detroit, April 12, 1922. The members were the guests of Parke, Davis & Company. Supper was served in the company's cafe, at 5:30 p. m., after which the members were escorted to the biological and research laboratories for the evening session.

The program was devoted to dietary deficiency diseases. Dr. A. D. Emmett gave an illustrated lecture on this subject, covering the history of deficiency diseases, their nature, symptoms and postmortem pathology, means of prevention and treatment. The vitamins were discussed as a whole and then individually, in their relation to the various diseases resulting from their ab-

sence in the diet. The lantern slides illustrating the points brought out by Dr. Emmett were very helpful in making these points clear.

Following this lecture a short paper was presented by Dr. H. Preston Hoskins, entitled "The Veterinarian's Interest in Dietary Deficiency Diseases." The author brought out the importance of a more thorough understanding of the subject of nutrition, especially as pertaining to our farm animals. Various pathological conditions observed among animals, and thought to be nutritional in character, were reviewed and the latest results of the study of these diseases were presented.

At the close of this paper the following were called upon to discuss the subject: Dr. F. W. Chamberlain, East Lansing, Mich.; Dr. E. P. Schaffter, Detroit, Mich., and Dr. J. E. Wurm, Pigeon, Mich. Following this discussion there was a rather unusual "clinic." Dr. Emmett presented a large number of animals showing the effects of restricted diets. Among the symptoms and pathological conditions shown were the following: Anorexia, loss in weight, intestinal disturbances, anemia, malnutrition and marasmus, leg weakness (chickens), edema (rats), polyneuritis (pigeons), posterior paralysis (rats), rickets, osteoporosis and osteomalacia (rats), xerophthalmia (xerosis) (dogs, rats, rabbits, chickens), scurvy (guinea-pigs), faulty development of tooth pulp, dental caries and irregular dentition (guinea-pigs, rats, dogs), endocrine disturbances (goiter, adrenal hypertrophy, testicular atrophy) (pigeons, chickens, rats).

Officers for the ensuing year were elected as follows: President, Dr. H. T. Carpenter, Detroit; Vice-President (Macomb County), Dr. W. L. Drinkwater, Utica; Vice-President (Oakland County), Dr. L. F. Baldock, Birmingham; Vice-President (Wayne County), Dr. J. Hawkins, Detroit; Secretary-Treasurer, Dr. H. Preston Hoskins, Detroit.

The association voted to accept the resignation of Dr. Judson Black, and then proceeded to elect him to honorary membership. Dr. Black is now located at Lansing, attached to the State Veterinarian's office. A vote of thanks was tendered Parke, Davis & Company for the splendid supper and program provided.

H. PRESTON HOSKINS, *Secretary*.

NATIONAL ASSOCIATION, BUREAU OF ANIMAL INDUSTRY VETERINARIANS, METROPOLITAN DIVISION

A meeting of the Metropolitan Division, N. A. B. A. I. V., was held in the lecture room of the Veterinary College, New York University, 331 East 26th Street, New York City, Wednesday evening, April 26, 1922.

Eighteen members were present, President Dr. N. L. Townsend presiding.

The committees on Auditing, Legislation and Program reported progress.

Dr. J. Huelsen, chairman of the Committee on Revision of the Constitution and By-Laws, presented the report of the committee. He submitted a draft of the proposed Constitution and By-Laws, which followed the main features of that of the National Association, with such changes as were applicable to the Metropolitan Division. This was read by sections and, after several changes, was adopted as a whole by the members.

The secretary-treasurer submitted a report of the financial condition of the Division.

The next order of business was the nomination and election of officers for the ensuing year. The balloting resulted in the election of Dr. Albert Long as president, Dr. C. R. Biederman as vice-president, and Dr. E. L. Sander as secretary-treasurer, the latter succeeding himself. The newly elected officers assumed office immediately and in so doing expressed words of appreciation to the members and assurances of their best efforts in behalf of the association.

It was with regret that members learned of Dr. Townsend's refusal to again assume the presidency, as it was felt that the past successful year was due considerably to the great interest and enthusiasm he displayed in the activities of the organization.

Under new business, the question of selecting a delegate to the next national convention at St. Louis, August 28 to September 1, was taken up for consideration. A motion was adopted that a committee of three be appointed to take charge of the nomination and election by mail. Drs. Huelsen, Isaacs and Thackaberry were appointed members of this committee.

Dr. Leland D. Ives' paper on the "Disposition of Carcasses Under Regulation 11. B. A. I. Order 211," presented at a previous meeting was then taken up for further discussion. The discussion which followed was at times quite lively and some interesting points, particularly with regard to the primary seats of tuberculosis, modes of entrance of tubercle bacilli and their dissemination in the body, were brought out. In fact, the subject was found to be so large and the time remaining at this meeting so short that decision was made to continue the discussion thereon at a future meeting.

E. L. SANDER, *Secretary.*

DAIRY CATTLE BREEDERS DISCUSS MUTUAL PROBLEMS

A two-day conference of representatives of pure-bred dairy cattle associations, including the Jersey, Guernsey, Holstein-Friesian, Ayrshire, and Brown Swiss organizations, was called by the Bureau of Animal Industry for May 5 and 6, at Washington, D. C., to discuss problems of mutual interest to all breeders of dairy animals and to the dairy industry. Secretary of Agriculture Wallace and Dr. J. R. Mohler, chief of the Bureau of Animal Industry, addressed the conferees.

The presidents of the five associations were invited to attend the conference and to bring any other representatives they might select. The heads of all these organizations, with the exception of former governor Frank O. Lowden, of the Holstein Association, who is in Europe, were present.

The list of associations and the representatives who attended are as follows:

American Guernsey Cattle Club, Robert Scoville, president, New York; S. M. Shoemaker, Maryland; Karl B. Musser, New Hampshire.

Ayrshire Breeders' Association, Paul O. Reymann, president, West Virginia; C. L. Burlingham, secretary, Vermont.

Holstein-Friesian Association of America, J. A. Reynolds, chairman of executive committee, Ohio; Fred Pabst, Wisconsin; H. W. Norton, Jr., Michigan; D. D. Aitken, Michigan.

American Jersey Cattle Club, M. D. Munn, president, Minnesota; George Sisson, New York; W. R. Proctor, New York; C. J.

Tucker, Missouri; O. H. Baker, New York; R. M. Gow, secretary,

Brown Swiss Cattle Breeders' Association, A. E. Bower, president, Ohio, and L. E. Hull, Ohio.

The conference was arranged to precede the annual meetings of the various associations, in order that early action could be taken on any recommendations that were made by the representatives.

NORTH CAROLINA VETERINARY MEDICAL ASSOCIATION

The date of the next meeting of the North Carolina State Veterinary Medical Association is June 28-29, 1922.

J. P. SPOON, *Secretary*.

MINNESOTA VETERINARY MEDICAL ASSOCIATION

The summer meeting of the Minnesota State Veterinary Medical Association will be held at University Farm. There is to be a joint meeting of the association and a short course given by the University of Minnesota. The sessions will be on July 12, 13 and 14.

We have secured a number of speakers from outside the state, among others being Dr. O. V. Brumley of Ohio State University, Dr. L. A. Merillat of Chicago, Dr. J. N. Frost from Cornell University, Dr. L. Van Es of the University of Nebraska, Dr. H. Lothe of Waukesha, Wis., Dr. H. S. Murphy of the Iowa State College, and several other men have given tentative acceptances.

Evening programs of an entertainment and educational nature are being provided. An interesting and instructive meeting is anticipated.

C. P. FITCH, *Secretary*.

NORTH DAKOTA VETERINARY MEDICAL ASSOCIATION

The North Dakota Veterinary Medical Association will hold its annual meeting at Fargo July 18 and 19, 1922.

R. S. AMADON, *Secretary*.

ILLINOIS VETERINARY MEDICAL ASSOCIATION

The picnic of the Illinois Veterinary Medical Association, together with the Lexington picnic, will be held in Miller Park, Bloomington, Illinois, the latter half of July.

"Watch the July number for dates."

D. E. SISK, *Secretary*.

SOUTH CAROLINA ASSOCIATION

On April 8, 1922, the South Carolina Association of Veterinarians held their annual meeting at the Jefferson Hotel in Columbia. The dinner was followed by a business meeting and the following officers were elected: Dr. W. K. Lewis, President; Dr. T. J. Kinard, Vice-President; Dr. M. R. Blackstock, Secretary-Treasurer.

M. R. BLACKSTOCK, *Secretary*.

EASTERN STATES TUBERCULOSIS CONFERENCE

The annual meeting of the Connecticut Veterinary Medical Association will take place in Hartford, Connecticut, June 6, 7, and 8. In connection with this meeting there will be held a tuberculosis eradication conference of state and Federal employees engaged in cooperative tuberculosis eradication work, as well as practitioners and livestock men from the States of New York, Pennsylvania, New Jersey, Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, and Connecticut.

Following is an outline of the program:

JUNE 6, 1922

(Beginning 9:30 A. M., Daylight Saving Time.)

Opening of the conference, Commissioner J. M. Whittlesey; Address of welcome, Governor Everett J. Lake; introducing Representative Connecticut Veterinary Medical Association to respond to Governor's address of welcome, Dr. G. L. Cheney; response to address of welcome, Dr. A. T. Gilyard; Tuberculosis Eradication Problems in the East, Dr. John R. Mohler; Report of Progress of Tuberculosis Eradication in Each State, Hon. H. M. Tucker, Maine; Dr. L. H. Howard, Mass.; Hon. A. L. Felker, New Hampshire; Dr. J. H. McNeil, Trenton, N.

J.; Hon. Berne A. Pyrke, New York; Hon. Fred Rasmussen, Pennsylvania; Hon. John J. Dunn, Rhode Island.

(Beginning 1:30 P. M.)

Accredited Herd Tuberculosis Eradication Work, Dr. T. E. Mumce, Pennsylvania; Dr. L. H. Adams, Vermont; Dr. R. W. Smith, New Hampshire; Dr. P. E. Quinn, Pennsylvania.

Difficulties in Eradicating Tuberculosis in Herds When Infection is Long Established—Dr. H. B. Leonard, New York; Dr. A. J. DeFosset, Vermont; Dr. W. G. Middleton, New Jersey; Dr. G. E. Corwin, Connecticut.

Area Tuberculosis Eradication Work, Dr. T. S. Rich, Michigan.

Discussion by Dr. Elmer Lash, Dr. J. B. Reidy, Dr. E. A. Crossman, Dr. E. T. Faulder.

Avian Tuberculosis, Dr. B. A. Gallagher, District of Columbia.

(Beginning 7:30 P. M.)

The Lymphatic System of the Cow as Related to Tuberculosis, Dr. S. Sisson, Ohio.

Tuberculosis Eradication, Prof. H. R. Smith, Illinois.

Prevalence of Bovine Tuberculosis in Eastern States, Dr. J. A. Kiernan, District of Columbia.

JUNE 7, 1922

(Beginning 9 A. M.)

Tuberculin Testing, Dr. G. E. Corwin, Connecticut; Some Facts Relative to Bovine Tuberculosis Eradication, Dr. E. C. Schroeder, District of Columbia; Necessity of Protection From Infection of Bovine Tuberculosis in the Control of Tuberculosis in the Human, Dr. David R. Lyman, Connecticut; Prevention of Tuberculosis, Dr. Edward B. Hooker, Connecticut; Tuberculosis as a Health and Economic Problem, Dr. John T. Black, Connecticut; Tuberculosis in Children in Various Forms, Dr. Cole B. Gibson, Connecticut.

WEDNESDAY AFTERNOON

Visits to Tuberculosis Sanatoriums.

WEDNESDAY EVENING

Banquet at the Greater Bond Hotel.

JUNE 8, 1922

(Beginning 9:00 A. M.)

Address, Mr. H. P. Hinekley, Massachusetts; Address, Mr. W. S. Martin, Vermont: Some Fundamentals for a Successful Tuberculosis Eradication Campaign, Mr. A. A. Hartshorn, New York; Address, Mr. Joseph Alsop, Connecticut; How the Veterinary Practitioner Is Co-operating in the Movement to Eradicate Bovine Tuberculosis, Dr. Thomas E. Maloney, Massachusetts; Discussion by Dr. Thomas Bland, Waterbury, Conn.; Dr. H. M. Lewis, Nashua, N. H.; Dr. E. H. Bancroft, Barre, Vt., Dr. P. T. Keely, Waterbury, Conn.

THURSDAY AFTERNOON

Visit to Model Dairy Farm upon invitation of Mr. Joseph Alsop, Avon, Connecticut.

OLDEST AGRICULTURAL SOCIETY

The Philadelphia Society for the Promotion of Agriculture held their annual meeting in the Library of the Veterinary School on April 12. This is the oldest Agricultural Society in the United States, having been organized 137 years ago. It has always been very active, has accomplished much in the past, and is doing a great deal of good today. Their library, which is one of the oldest and most valuable collection of books on agriculture in this country, is kept in the Veterinary School Library, where it is their custom to hold their annual meeting. Doctors C. J. Marshall and L. A. Klein were elected curators of the society.

COMMUNICATIONS

ADVERTISING VETERINARIAN NOT AUTHORIZED TO MAKE FEDERAL TUBERCULIN TESTS

To the Editor:

On April 14, I received a copy of a daily paper published in a western state which contained an advertisement of a regularly registered veterinarian who claims over forty years of practical experience. The ad. further gives the information that this man has successfully passed an examination for the purpose of determining his fitness to conduct tuberculin tests, and that "local subcutaneous tuberculin tests" conducted by him will be approved by his state, with payment of state indemnity for reactors found.

This advertisement was forwarded to me with an unsigned query as follows:

"HOW DO YOU RECONCILE THIS WITH YOUR PARAGRAPH 'NO ADVERTISING'?"

On carefully reviewing the advertisement in question, I note that no reference is made to accredited-herd work, but an examination conducted for veterinarians who desired to be entered upon the accredited-herd list is mentioned. The advertiser evidently realizes that he is not eligible to do interstate or accredited-herd testing, although my questioner may be properly excused for not understanding that the word "local" in the phrase "local subcutaneous tuberculin test" refers to geography and not anatomy.

In order to obtain definite information regarding this matter a letter was sent to the State Veterinarian, who replied promptly, stating that the advertiser is a non-graduate and is neither an approved nor an accredited veterinarian in the cooperative tuberculosis work. He, however, has been authorized by the State for local work, but I am informed that he is the only non-graduate in that state who possesses even that authority. All approved and accredited veterinarians doing cooperative tuberculosis work in the various states have received instructions to the effect that their credentials were not to be used for adver-

tising purposes, under any circumstances, but of course the advertiser in question does not come in this category.

My object in sending this letter for publication is with the hope that my anonymous correspondent and any others who may have become exercised over the objectionable advertisement will get to see this presentation of the facts in the case.

J. R. MOHLER,
Chief of Bureau.

NOT CONNECTED WITH IOWA COLLEGE

To the Editor:

We have received a number of inquiries regarding articles written by Dr. G. H. Conn, who is general manager of the Conn Products Company of Waterloo, Iowa.

The Conn Products Company are manufacturers of mineral substitutes for livestock and joultry foods. On account of the impression that Dr. Conn was connected with the Iowa State College in some capacity, I wish to say that he has never had any connection whatever with the Veterinary Division of this institution, either as a student or member of the faculty.

I dislike to write this letter, but I feel that in justice to all concerned it should be clearly understood that Dr. Conn is in no way connected with our work here.

C. H. STANGE, *Dean.*

A FIFTY-ONE-YEAR-OLD HORSE

To the Editor:

Enclosed please find an editorial from the *New York World* of April 20.

It would be very interesting to see the few bolts and nuts that might possibly be in existence fifty-one years after a motor-drawn vehicle was built.

The horse referred to in the editorial is owned by a clergyman at Catawissa, Pa., and is still in very good condition and capable of rendering service.

R. M. STALEY.

Philadelphia, Pa.

The editorial is as follows:

"CLOVER, THE OLDEST HORSE

"Accepting the opinion of Dr. R. W. McCully, the experienced veterinarian whom *The World* commissioned to examine the horse Clover, the pride of Catawissa is fifty-one. Very few horses live to be thirty-five. At that age Clover was a youngster. Since those days of his colthood he has put sixteen years behind him and is out to better his record and add to his fame.

"That Dr. Myers, the clergyman who owns Clover, has had him for thirty-five years has been established. Before that he 'was raced as a trotter and worked as a work-horse for ten years,' according to the evidence gathered by Dr. McCully. Only last year he made a trip of ten miles, a remarkable feat for a horse of that age. Whcever doubts it is quarrelling with the facts and may as well admit that he is beaten. There are people that will question the calendar and argue that the sun is ahead of time.

"Clover is fifty-one. He owes it to his good stock, to his good habits, his playful disposition, his sound appetite, regular feed and exercise and the excellent care he has had at his master's hands. It is a partnership that reflects great credit on horse and owner. They have lived together the best part of their lives, are inseparable friends and deserve well of the world."



MISCELLANEOUS

A NEW POSITION FOR DR. YUNKER

Dr. Elkan H. Yunker, of Philadelphia, who has been connected for several years with the State Bureau of Animal Industry, has been appointed field representative for the Pennsylvania Society for the Prevention of Cruelty to Animals, to cover the entire state in the interests of humane work in its relations with the public health. So far as is known this is the first time in the history of the humane movement in this country that a trained technical man has been selected for such a position, and it is expected that great benefit will result from his appointment.

Dr. Yunker will address farmers' institutes, county fairs and other assemblages, to urge the practical advantages of consideration of the health and comfort of horses, cattle, sheep and fowls, economic and humane methods of transportation, disease prevention and sanitation. He will also aid in the establishment of other S. P. C. A. organizations and assist those already formed. Leading veterinarians are in strong accord with the new plan of the Pennsylvania S. P. C. A. and will support Dr. Yunker in his campaign to improve the conditions of farm and town animals, especially those destined for food. Dr. Clarence J. Marshall, former state veterinarian and now a member of the faculty of the Veterinary School of the University of Pennsylvania, voices the opinions of his colleagues when he says that he considers the selection of Dr. Yunker for the post a peculiarly happy one and that the undertaking is one of the greatest moves for public welfare ever put forward by any humane society.

Dr. Yunker was born in Cincinnati, and is a graduate of the Veterinary School of the University of Pennsylvania. Following some twelve years of private practice he entered the state service and was recently representative of that office for the Philadelphia and Delaware county district. Of pleasing personality and great tact, he will bend his efforts to bring about cooperation and understanding between the farmer, the veterinarian, the humane societies, the state and federal inspection boards, and the public, to the ultimate benefit of everyone concerned.

Nearby trips will be made in his own car and he will have interesting moving-picture films of humane activities, to accompany his lectures. The Pennsylvania Society, with headquarters at 922 North Broad Street, Philadelphia, was the first organization for animal relief to be founded in the state and the second in the country. John W. Salmon, a life member, originated the spindle coop, with automatic water and feed trays, for shipping poultry, which has gained Pennsylvania the reputation of transporting fowls more hygienically and humanely than any other state in the Union. The Pennsylvania Society is also practically the founder of the Veterinary School of the University of Pennsylvania, having solicited the first fund to be raised for that purpose.

WORMS IN CATS

By W. J. LENTZ

Philadelphia, Pa.

CATS are subject to tapeworms and roundworms, more frequently the latter. Their presence creates an unthrifty appearance; the fur is harsh, dry and without luster. Usually the appetite is capricious; ravenous if tapeworm is present. Sometimes the animal becomes suddenly crazed with excitement, jumping through a window or madly racing up and down stairs; finally convulsions.

The younger the animals the more intense are the general nutritive disturbances. Diarrhea, anemia, emaciation and a potbellied appearance (which is more pronounced when emaciated) are also often symptoms. Occasionally colicky pain is a pronounced symptom. Migration of roundworms into the stomach of the cat is of frequent occurrence, causing retching, vomiting (vomit is composed of mucus and bile), fetid breath, colicky pain and frequent husky cough. We have on a number of occasions found roundworm infestation in cats ten and twelve years of age.

Treatment.—Whenever a round or tapeworm is to be attacked practically all nourishment should be withheld for at least from twelve to twenty-four hours in order that no food in the intestinal tract may protect the worm from the action of the drug. During this time a little milk may be given, and after a night of fasting, before breakfast, the anthelmintic should be ad-

ministered. In addition all remedies should be followed by purges in order to dislodge the intruder while it is paralyzed, and in many instances it is well to administer a normal saline rectal injection to facilitate removal. Sometimes an emetic of warm salt and mustard water will cause worms to be vomited, but unless the animal is a robust one, it is inadvisable to increase the generally existing irritation of the stomach. Such treatment should be followed by a mucilaginous diet, such as white of egg, barley water, arrowroot, etc., in order to soothe the mucous membrane.

As to the selection of the vermifuge, one should take into consideration chiefly the constitution of the animal. As a rule, those used on the dog will suffice, but in about one-half the dose indicated for dogs— $1\frac{1}{2}$ to 1 grain of santonine in 2 drams of castor oil or $\frac{1}{2}$ to 1 grain of santonine and 3 or 4 minims of oil of malefern in a dram of olive oil is a most efficacious vermifuge for roundworms. Santonine and calomel from $1/16$ to $1/8$ of a grain each in repeated doses two hours apart until $\frac{1}{2}$ to 1 grain is given, the last dose to be followed some two to three hours later by castor oil or milk of magnesia; 20 to 30 grains of freshly ground arecanut for tapeworms in milk or with butter, or malefern emulsion, consisting of malefern 1 dram, powdered gum acacia 2 drams, glycerine 2 drams, water $21\frac{1}{2}$ drams: shake well, dose 1 to 4 teaspoonfuls, depending on age.

Treatment of the animal should not stop with the administration of the vermifuge, as it should be borne in mind that the medicaments employed with the idea of destroying the parasites are, of course, likewise in a sense injurious to the host. Therefore, an attempt should be made to rid the system of the drugs used, and, aside from the irritation of the intestinal or gastric mucosa caused by the worms or drugs used, one should consider the effect of the poisonous products formed by certain enzymes of the worms. These cause nervous disturbances and inflammatory changes and perhaps products of decomposition from dead worms. We have found milk of magnesia in repeated dosage to fulfil the above requirements, also because of its tendency to reduce the generally existing inflammation of the gastric and intestinal mucosa. A tonic, such as cod liver oil and iron, is indicated.—*Veterinary Extension Quarterly, U. of P. Bulletin, No. 5, January 7, 1922.*

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VETERINARY OPPORTUNITIES

THE advance of the veterinary profession has been phenomenal. Only a few of the old-time "farriers" or "hos" doctors remain. The services of educated veterinarians are in demand as never before. Formerly the veterinarian's work was confined to treating animals for disease; now the scope of this profession embraces the control of animal contagions and guarding the public health in pure-food inspection and other lines.

The standards in veterinary education are higher now than were standards in human medicine ten years ago.

There are splendid opportunities in veterinary lines for young men of character, who have been trained in one of the best veterinary colleges.

Food inspection is destined to soon be a regular thing in cities of the first and second class, and the veterinarian is the only man especially trained for this work. The control of animal diseases is demanding more and better men. There is a call for specialists in bacteriology, pathology; for practitioners in places where there are none; for veterinarians in the army and other lines.

Young men will do well to think of this profession before they decide upon their vocation.

It pays to be "a hail fellow, well met"—a good mixer, to have friends. Of course, the way to have friends is to be one. These and other things make for what is called tact. Tact has been defined as, "The moral sense of touch." Each day is a round in contending with the human problem. The human equation has just as many factors as our activities create. The one who is wise enough to meet them unperturbed, maintaining his equipoise, disposing of them without malice, profiting by the exercise of self-mastery and calm deliberation, is the one who will grow into the full stature of business and professional manhood. The one best test of a man's sanity is the way he manages himself.

G. H. G.

THE CAREFUL USE OF TECHNICAL TERMS

CONFUSION exists in the use of several terms relating to veterinary science and livestock. Loose and sometimes erroneous terminology is often found not only in newspapers but in works of veterinary authorship. It is too much to expect that even a well-educated person will always know the correct name or the preferred form of expression for everything under the sun; but a professional man or a specialist in any field should certainly endeavor to use in a correct and discriminating way the technical terms relating to his particular branch of knowledge.

A common inaccuracy is the use of "thoroughbred" in the sense of "purebred." This is given some sanction by ordinary usage, but it should not be perpetuated by those who are supposed to know about such things. "Thoroughbred," in the strict sense in which it is used by persons well informed in animal breeding, is the name of an English breed of running horses, and when used in this way the word should be capitalized just as the name of any other breed. The preferred term applicable to "blooded" or "pedigreed" animals in general is "purebred." It is therefore just as absurd to speak of "a thoroughbred Jersey cow" as it would be to refer to "a Shorthorn Berkshire pig" or "a Shropshire Morgan horse." The correct expression, of course, is "a purebred Jersey cow." If veterinarians do not wish to appear ignorant before progres-

sive, intelligent stock-raisers they should be careful not to use the word "thoroughbred" except when referring to the particular breed of horses bearing that name, and should say "pure-bred" when that word expresses what they mean.

Another stumbling block is the use of the words "tuberculous" and "tubercular." Formerly these were used interchangeably and the question was only one of personal choice. In the interest of precision and uniformity, however, the National Association for the Study and Prevention of Tuberculosis adopted in 1906 in its official publications the term "tuberculous" to refer to lesions or conditions caused by the tubercle bacillus, and the term "tubercular" to describe conditions resembling tubercles but not caused by the tubercle bacillus. For example, nodules caused by something other than the tubercle bacillus may be tubercular in form or appearance, but they are not tuberculous; while a person or an animal affected with tuberculosis is tuberculous, not tubercular. This distinction is followed by careful writers on tuberculosis, but we still often read "tubercular" in the sense of "tuberculous," not only in the lay press but sometimes in professional papers. The newspapers of Washington, D. C., have recently been much exercised over a "tubercular school," which according to the distinction above drawn would mean a school building in the shape of tubercles but not caused by the bacillus of tuberculosis. What is really meant, of course, is a school for tuberculous children.

Occasionally, too, we read or hear the expression "per orem." This, unlike the terms already discussed, is not merely a matter of discriminating usage but is actually erroneous. If we misuse our own language what can be expected when we venture into others? The Latin word "os" is a neuter noun, and the accusative case takes the same form as the nominative. The correct form is therefore "per os." The English equivalent of any such term is always safer for a person having only a meager knowledge of Latin.

Many writers on veterinary science show a lack of familiarity with the fine points of biological nomenclature—the system of Latin names given by scientists to organisms in the plant and animal kingdoms. This question involves both the correctness of the names themselves and the correct style of writing or printing them. The zoologists have an excellent international code which is generally followed by specialists in that field. In

bacteriology, however, the standards are not so clearly defined and there is more or less confusion and loose usage.

A veterinary writer should verify the names of organisms about which he undertakes to write and should be careful to use the latest accepted forms rather than obsolete names. One who, for example, today writes of the southern cattle tick as *Boophilus bovis* (instead of the corrected name *Margaropus annulatus*) discloses his lack of knowledge of the subject he is discussing. In printing biological names the preferred style is to use italics and to capitalize the generic name but not the name of the species (even though the latter may have been derived from a proper name), thus: *Ascaris equorum*, *Bacillus welchii*, *Streptococcus viridans*. Such names should not be confused with Latin names of anatomical parts, drugs, diseases, etc., such as *membrana nictitans*, *tinctura iodi*, *purpura hemorrhagica*, which are not governed by the same style. It is unfortunate that many text-books are not safe guides to accuracy and good style in matters of nomenclature.

SYMPTOMS FURNISHED BY THE TEETH

The New York Medical Journal for April 17, 1920, has an editorial on this subject. Among other things it says:

"One of the most interesting findings is the intimate relationship existing between the lateral incisors and the gonadal endocrine chain. We find that in the male the position of the testicle is indicated by the position of the lateral incisor of the opposite side; an undescended testicle will accompany an unerupted lateral incisor. A twisted lateral incisor is indicative of torsion of the cord. In the female the same relationship applies to the ovaries. Furthermore, a faintly developed lateral incisor indicates a similar condition of either ovary or testicle. When there is a complete absence of the lateral incisors in the female she will not bear children, and her menstrual discharge will be scanty. It seems as though the sex of the offspring is in direct relationship to the lateral incisors. The right one controls the male and the left one the female. If the right lateral incisor is missing the mother will give birth to girls only; if the left one is missing she will give birth only to boys. Of course this refers to a congenital absence of the teeth and not to their loss by accident or removal."

This is interesting and, if it is true and holds good in veterinary practice, would be an excellent method of determining on which side the undescended testicle in a ridgling is located. It would seem, if the statements made in the editorial referred to are correct and apply to the lower animals, that someone would have noted this peculiarity so far as ridgeling horses are concerned.

Will some of our readers supply us with data on this point so that we can confirm or disprove this theory so far as animals are concerned?

TUBERCULOSIS ERADICATION

ONE of the strongest speeches we have heard in whole-hearted support of tuberculosis eradication was given the other day by a Nebraska farmer. At first thought one would not expect that he would favor the plan of testing animals for tuberculosis. His own herd had been tested and forty-five out of a total of fifty-eight animals reacted and of course had to go to market.

In speaking of the matter, he said: "I was glad to find out definitely the fact that my herd had the disease and get them cleaned up. I am for tuberculosis testing of cattle. It is a protection for farmers."

The attitude of this man is different from the all too prevalent attitude several years ago. At that time many owners of livestock were somewhat opposed to an inspection of their herds in the endeavor to locate disease. They felt that if tuberculosis or any other disease was found that it would tend to react against their business and cast reflection on their efforts as livestock breeders. The large waiting list of farmers in every state who wish to have their herds tested at the present time is indicative of their desire to see the white plague driven from their communities.

There is some talk about having a bill introduced at the next session of the legislature to make testing for tuberculosis in cattle compulsory. We have the faith to believe that by the time the next legislature meets there will be sufficient sentiment throughout the state on the part of the livestock owners to make such a bill unnecessary. Here and there men will doubtless be found who are opposed to testing of their herds. These men can probably be influenced by their neighbors to the importance of this work.

The testing of tuberculosis in cattle is not simply a matter

that concerns the individual beef or dairy cattle owner. It is of public concern, for it concerns the man who buys meat or who purchases milk. The statement of Dr. Abt of Northwestern University Medical School at the conference in Chicago held for the purpose of discussing bovine tuberculosis, that the medical profession could not hope to eradicate tuberculosis from the human family until undivided attention was paid to the disease in cattle, is of far-reaching significance. It emphasizes the fact that the campaign of eradication has more than simply an economic aspect. It concerns all of us.—*Editorial in Daily Drovers Journal-Stockman, Omaha, Neb.*

ALL ABOARD FOR ST. LOUIS CONVENTION

FOR MEMBERS who plan to attend the A. V. M. A. convention in St. Louis, August 28 to September 1, special transportation arrangements have been made for a really enjoyable and comfortable trip. The Wabash Railway has been selected as the official route from central territory, and special Pullman arrangements will be provided from all the principal gateways, where direct connection is made from all points for fast, convenient service to St. Louis.

Tentative plans are as follows: Special train of modern steel Pullman sleepers and club cars to leave Chicago, Dearborn Station, Sunday, August 27, at 11:45 p. m., arriving at St. Louis at 7:41 a. m., the following morning. (Sleepers to be ready for occupancy Sunday at 10 p. m.) All members who go through Chicago are cordially invited to join the Chicago Special and travel in a body to St. Louis. Members going via Detroit, Buffalo, Des Moines, Omaha, etc., will be provided with special Pullman accommodations and should get in touch with the various Wabash passenger representatives in their sections, who will be pleased to furnish complete information and make reservations.

Reduced rates of one and one-half fare on the certificate plan have been granted by the Central Passenger Association, and will probably be granted by the other passenger associations, as application for rates has been made.

For detailed information write to Mr. John Maloney, Assistant General Passenger Agent, Wabash Railway Co., 144 South Clark Street, Chicago, Ill. .

Start planning NOW for this trip. LET'S GO!

THE VETERINARY OUTLOOK FROM A TEACHER'S VIEWPOINT¹

By PIERRE A. FISH

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TO THOSE without the gift of prophecy any attempt to penetrate the future is futile; but a consideration of present and past events may enable one to reach conclusions which have more or less bearing on the trend of future events. It is obvious that if the number of domesticated animals were markedly decreased and there were a tendency to continue toward the vanishing point; if the production of such animals were unprofitable and if there were no demand for them, there would be little use for veterinarians. Until science can produce food and raiment entirely from synthetic or vegetable sources; until the fertility of the soil can likewise be assured from other sources, we can safely assume that there will be a demand for animals to sustain and support the human race. Our dependence upon animals existed even before the beginning of civilization, and with the progress of the centuries this dependence has been intensified rather than weakened. Higher and better types have been evolved, and with improved breeds there have been increased values. With increased values there has been an increased demand for protection against the ravages of diseases peculiar to animals as well as those transmissible to man. The tendency in recent years has been toward the production of better animals and better veterinarians to safeguard their health.

Statistics from census reports show that there have been fluctuations in the number of certain groups; some have shown a considerable increase while others have shown a marked decrease. This feature has been exemplified in the census report for 1920, which shows a loss of 18,604,376 among the horses, asses and burros, and sheep. This loss is partially offset by a gain of 9,623,211 among mules, cattle, goats and swine, diminishing the total net loss to 8,981,162. The loss among the horses, asses and hurros, 1,200,894, is a little more than compensated

¹ Presented at the meeting of the Genesee Valley Veterinary Medical Association, Rochester, N. Y., January 4, 1922.

for by the gain in mules, 1,348,735, leaving a net balance in favor of the mules of 147,839. This would indicate that, as a source of motive power, the mule is supplanting the horse to some extent. The chief source of loss to be considered is the sheep, in which the average *annual* rate of decrease for the decade has been 1,740,348. This rate of decrease has been more rapid than the rate of increase among the cattle, goats and swine, and therefore leaves a deficit of over 8,000,000 in the total of all the domesticated animals. In the routine of the general practitioner there is probably less call for his service for the sheep than for the other animals, and the loss, serious as it is, doubtless affects his practice much less than if the cattle or swine were involved. Among various possible factors concerned in this diminution in the number of sheep there may be two of economic interest. If wool may be imported from other countries more cheaply than it can be produced here, there would be little incentive in raising sheep for that purpose. If the public taste prefers beef and pork to mutton, the production of sheep for food must necessarily adjust itself to the demand.

Summarizing the last census report relative to the number of the domesticated animals, it would appear that there has been an actual increase in the animals with which the veterinarian is more directly concerned—cattle, swine and horses (if the gain in mules be substituted for the loss in the latter group). The census report does not include the number of pet animals, which, in the larger cities, it may be inferred has not been diminished, since numerous veterinarians derive their income from this source. It is interesting to note that the census reports New York as leading all the other States in the number of horses *not* on farms, with Illinois second and Pennsylvania third, although the number is approximately one-half of what it was in 1910.

The census has also furnished data relative to the value of livestock on farms, and here, in spite of a decrease in the number of animals, there is given a very decided increase in the values. For 1920 the value of livestock on farms is given at \$7,605,917,190; for 1910, \$4,760,060,093, an increase of \$2,845,857,097 or about 60 per cent. New York is one of nine States reporting values in excess of \$300,000,000. The value of cattle on farms in the United States in 1920 was \$3,634,334,624, nearly one-half of the total value of all livestock. The States

reporting the largest values for cattle on farms in 1920 were Texas, Iowa, Wisconsin, New York and Illinois. The average value per head, for 1920, was: For horses, \$90.13, a loss of about 15 per cent as compared with the 1910 valuations; for mules, \$142.88, an increase of about 14 per cent; for cattle, \$54.40, an increase of 124 per cent; for sheep, \$11.30, an increase of 154 per cent; for swine, \$16.66, an increase of 142 per cent.

The Yearbook of the United States Department of Agriculture gives information showing that in New York State in 1910 there was the ratio of one veterinarian to 5,315 domesticated animals with a value of \$193,390. In 1920 the ratio increased to one veterinarian to 5,898 animals with a more than doubled valuation of \$393,704. The figures from the latest census returns, for either the number of animals or their valuation, would indicate that the outlook for the veterinary practitioner is not discouraging.

The primary necessity of a veterinarian is material upon which to practice. The evidence already presented indicates that the material is available, and the very decided increase in the valuation of this material points toward an increased demand for the practitioner's services. Is the demand being met, and if not, what are the reasons for it? Just prior to the outbreak of the World War in 1914 statistics were published which showed that the output of veterinary graduates in the United States (750) was 50 per cent greater than the combined output of Denmark, Germany, France, Sweden and the British Isles, and, with the exception of Denmark, that in proportion to the population of the countries concerned, the output here was double that of Germany or Sweden and even greater than that in the case of France or the British Isles. At that period the evidence indicated that the quantity of veterinarians was sufficient—perhaps more than sufficient—and that steps should be taken to improve the quality of the practitioners.

With the entrance of this country into the war in 1917, the veterinary along with other branches of education became more or less disorganized, but in spite of this an impetus was given to higher standards for veterinarians through the action of the War Department in insisting upon high educational requirements for those entering its service. The American Veterinary Medical Association, after a number of years of effort, took a

similar stand. The acceptance of the higher standards resulted in the discontinuance of all but two or three of the private schools. In the past the private schools had been the source of the greater portion of the veterinary output, but higher standards meant fewer students, and the financial loss involved rendered the continuance of these schools unprofitable.

During the post-war period of three years there has been a marked decline in the number of students taking the veterinary course in the thirteen State schools now existing. The probability is that there has been a similar decline in the two or three remaining private schools. The following statistics are based upon data compiled by Dean D. S. White of Columbus, Ohio. During 1919-20 the total attendance in all classes in the State schools was 800, only a few more than the output from the senior classes of the State and private schools five or six years before. The seniors of 1919-20 numbered 190, about one-fourth of those of the previous period. In 1920-21 the total attendance dropped to 708 and in 1921-22 to 641, representing a successive loss of 11 and 9 per cent, respectively. In the present situation interest centers chiefly around the entering class, for here will be the first indication of a continued loss or an upward trend. In 1920 the entering class numbered 164; in 1921 it numbered 163, showing that, for the present at least, the downward tendency has been checked. In 1920 two of the State schools showed a combined gain of five in the freshman class, while the remaining eleven schools showed a loss of 108. In 1921 seven of the State schools showed a gain of 32 freshmen, while six showed a loss of 34. From these figures it may be inferred that a balance has been struck against the losing forces; that several of the schools have not only held their own but made some gain, and that with favorable conditions there will be still further increase in the future.

Since the war there has been an increase in the attendance at the veterinary schools in France and Germany. The total attendance at the principal veterinary schools is given at 2242.¹ This, compared with the attendance at the American schools for 1921, shows an increase of about 250 per cent. Evidently a different set of factors is in operation here than in the countries mentioned. In the past France and Germany trained a large percentage of their veterinary students for military serv-

¹ D. S. White. *Our Profession*. Jour. A. V. M. A., April, 1921, p. 14.

ice. It may be assumed that France, still maintaining a large army, utilizes a large number of veterinarians in that branch. In the case of Germany it is more difficult to explain the situation.

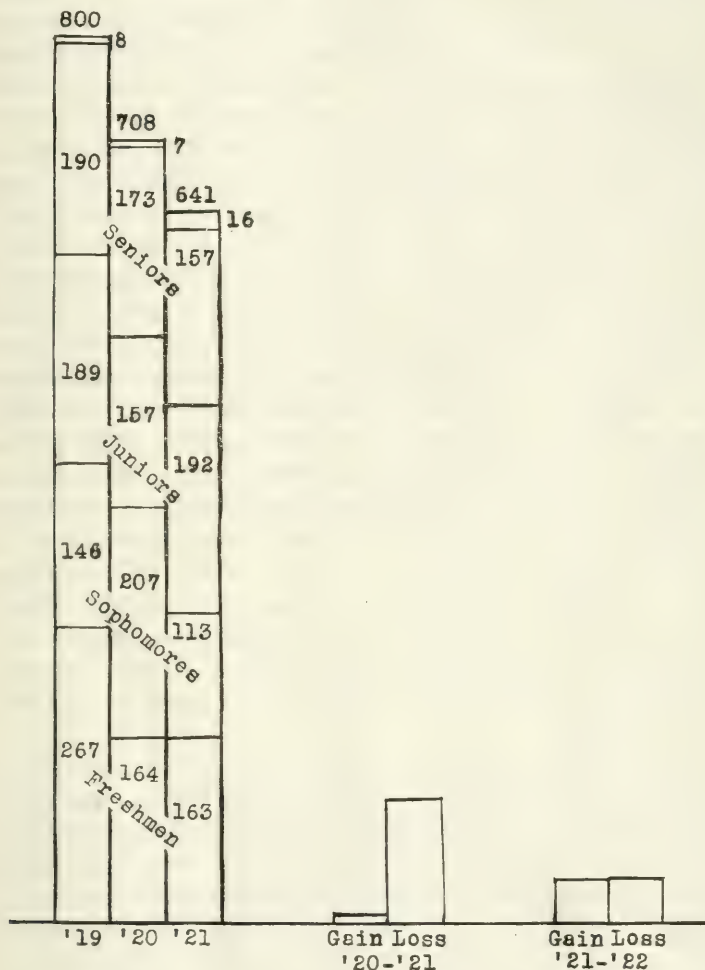


Diagram showing attendance at State schools for college years 1919-20, 1920-21, and 1921-22. The total attendance is noted at the top of each column and the figures within the spaces indicate the number in each of the classes. The small diagrams at the right show the gain and loss in the entering classes for 1920-21 and 1921-22. The large diagram shows that the greatest loss, after matriculation, occurs between the freshman and sophomore years

The backwash of the war has brought to the surface some factors which may have a more or less direct bearing upon the

decreased number of veterinarians in this country. It is assumed that the number has actually decreased, although as yet it has not been possible to confirm this by obtaining the actual number from the last census for comparison with the 11,562 veterinarians given in the 1910 census. Some have returned from the war to find their practices disrupted or taken over by other veterinarians, and have consequently taken up other lines of work. Some, after the excitement of their war experiences, have resumed practice discontentedly and have developed a more or less pessimistic outlook for the future. Some have returned to even greater opportunities with renewed confidence and optimism. Some city veterinarians have been unequal or unwilling to adjust themselves to the task of developing a country practice which, on account of a certain amount of displacement of the horse by the automobile, appears to be the principal source of income for veterinarians henceforth. In the backwash of the war there also looms large the difficult matter of readjustment to normal conditions. This is the period in which we find ourselves at present, and it affects many other lines of endeavor quite as severely as it does the veterinary profession. The prosperity of the veterinarian has come to be closely linked with the prosperity of the farmer. With foreign markets unsettled, with rates of exchange wildly fluctuating and foreign trade thereby greatly diminished, the farmer, and incidentally the veterinarian, reflexly suffers the effects. Any reaction which depresses general prosperity depresses the veterinarian as well.

The enforcement of higher educational requirements is always followed by a decrease in attendance, but the effect has been unusually severe when applied during a period of readjustment with its depressing accompaniments. This, with other factors, has had much to do with the decline in the number of veterinary students. It is probable that no other profession showed a greater degree of patriotism in participating in the late war than did the veterinary profession, and it is probable that no other profession showed so great an amount of disorganization in its ranks after the war was over. In this trying period some practitioners have felt that their practice has been curtailed through State and Federal interference. Although it has been intimated that such a condition would be temporary and further intimations have been made that

increased work would result in the future, some have nevertheless become discouraged and perhaps diverted into other lines of work. Under such conditions they would naturally forbear to urge young men to enter this field of endeavor, and thus another factor may be introduced in accounting for a decrease in veterinarians.

In an offensive or defensive attack against plagues or epidemics which may gain a foothold in our country, or a crusade for the eradication of an infectious disease which has been long established in our midst, organized effort with a controlling head is the efficient method of gaining the desired victory. Such an arrangement is effective in military procedure, and, as in time of war, there may arise the necessity for the sacrifice of a certain amount of individual liberty in order to insure success; but it is imperative that the plans of the campaign must be formulated as correctly and completely as possible or the victory will be materially delayed.

In the mists that are at present enveloping our profession, there is assuming more or less definite form the question of State medicine. There are those who believe that it is inevitable as applied to veterinary practice and that certain benefits may accrue from it. To most veterinarians it is doubtless a vague and indefinite question. Numerous attempts have been made to enact such legislation, usually by the laity, relative to the medical profession; but in the main this has been strenuously opposed by the majority of the physicians. The compulsory health insurance law, with its provision for restricted fees, free medicines, free surgical treatment, is an example. The system has been put in effect in some foreign countries and it has been reported that the physicians concerned were opposed to it. The problems of the veterinarians are not identical with those of the physicians, but there are some points of contact. Laws relative to public and animal health are distinctly medical problems and should emanate from or be vouched for by the medical and veterinary professions.

State laws are supreme within the boundaries of the State. Federal agents can not undertake work in connection with animal diseases within those boundaries except with the consent of the State, in cooperation with the State authorities and in conformity with the State laws; but the Federal authorities are interested for the protection of other States where inter-

state traffic may occur in diseased animals. State medicine has been defined by a Federal veterinarian as follows: "The activities of both the State and National authorities and those in active association in the prevention and control of disease constitute State medicine, or, in other words, organized action in combating disease." This would seem to imply that on the veterinary side a form of partnership exists or should exist between the State and Federal governments in connection with State medicine. Usually organized action is invoked in connection with infectious disease, and this is doubtless what is intended in the definition, but the ordinary practitioner has much to do with sporadic disease, and it has been claimed that if statistics were kept a much greater percentage of loss would be shown in the latter than in the former group. State medicine, in part, already exists for some infectious diseases; it is not necessary for all. Especially virulent infectious diseases or those which affect large areas need cooperative or organized action for their eradication, but there is not true cooperation nor complete organization in such effort unless duly qualified local practitioners are utilized.

The subject of State medicine is an intricate one and the farther one goes the more intricate it gets, but some fundamental questions may be asked: Will the individual veterinarian be simply a cog in a political machine? Will State medicine encourage individual initiative? Will it serve as an incentive to higher ideals? Will it stimulate to greater effort, or will it adapt the service rendered to the salary or fees received? Will the individual freedom of the practitioner be enlarged or restricted? Will State paternalism be ultimately extended to other professions such as law and theology? Practitioners treat bodily ills; theologians are concerned with spiritual ills. Are the latter as important as the former? State medicine has a bearing on the outlook for the veterinary practitioner and should receive very full and careful consideration.

One weakness of the veterinary profession has been in its lack of organization. There has been no time when organization is needed so much as at present. The direction of veterinary service should be placed in the hands of veterinarians, not in the hands of politicians. Veterinary administration by veterinarians! Its work is too serious and too important to be subjected to the caprice of political expediency. In the late

war the enemy because of superior organization won four years of victories, and it was not until a similar organization was effected in the ranks of the Allies that the tide of victories turned in their favor. Practitioners are the backbone of the profession. The backbone is the support of other skeletal elements. The combined action of veterinarians can successfully support policies beneficial to their own interests and to the livestock industry. By the same token they can defeat those projects which are inimical to their progress.

In the commercial world there have been instances where changed conditions have rendered it necessary for manufacturing plants to adapt their machinery and equipment to a totally different kind of production if they were to continue their existence. There has been a similar change in the character of veterinary practice and a similar necessity for veterinarians, on account of the diminishing horse practice, to adapt themselves to the increasing demands for their services in relation to the other domesticated animals. The opportunity is different but it exists with undiminished force.

The topics thus far discussed have a bearing on the outlook for the veterinary practitioner. It has been the aim to present the facts as they appear, whether encouraging or discouraging. False optimism has no advantage over pessimism and is probably more misleading. The evidence from the census reports indicates unmistakably that there should be as great a demand as ever for the service of veterinarians. The data from the attendance at the veterinary schools show that half of the institutions have checked the loss and made slight gains over the previous year. The schools at present are balancing on the edge of loss and gain and another year or two will be required for positive information. Whether there should be a greater or diminished tendency toward State medicine as it affects the practitioner should be most carefully considered and the utmost effort made to determine the possibility of its developing into a benefit or a menace. The loose organization of the profession should be tightened into a more efficient mechanism. If properly effected it may prove to be a very potent factor in the outlook for the veterinarian. The inference from these statements is that there are positive factors favorable to the outlook, but there are also factors which may work for or

against favorable results and more time will be required for this determination.

In this day and age remunerative returns are usually the first consideration in all lines of endeavor. This must necessarily be reckoned with, but there are some who have ideals beyond that. There is nothing higher nor finer than the veterinary profession in opportunities for service. There is nothing more uplifting than the alleviation of the suffering of the dumb creation confided to our care, guarding their welfare, and assisting in safeguarding the public health from communicable diseases. There is a satisfaction beyond payment in watching the repair of a wound, in healing bruised tissues and assisting Nature in restoring the weak and debilitated body to sound and vigorous activity. The reward comes, not necessarily with success, but with the satisfaction of honest work faithfully performed.

DEATH FROM SNAKE BITES RARE IN U. S.

Although the average mortality from American venomous snakes is a little more than 10 per cent of the persons bitten, death from snake bites is quite rare, because relatively few persons encounter or are bitten by the dangerous species.

The most venomous of our native snakes live in lonely, little-settled districts, often on stony or swampy land that can not be cultivated. Usually they disappear at the approach of man, and while they may strike if provoked, the popular belief in respect to the distance they can strike is erroneous. Three-fourths of their own length is about the greatest distance possible. If the legs are well protected when one is going into deep woods or places known to be infested by rattlers or other poisonous snakes, there is slight chance of being bitten.

As the food of snakes consists of living prey, they can not be killed by poisoned baits. The only method thus far devised to kill them seems to be clubbing or shooting. This is best done in early spring, when they are still sluggish after the winter hibernation. Allowing hogs free run of infested land may reduce the number of snakes. However, the popular idea that hogs are immune to snake bite is probably based on the impenetrability by the venomous fangs of their thick skin and adjacent layer of fat.

THE PRESENT STATUS OF VACCINATION AGAINST ABORTION DISEASE OF CATTLE¹

By E. C. SCHROEDER

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of Animal Industry, Bethesda, Maryland*

IN A PAPER on infectious abortion of cattle presented at a meeting held at the University of Pennsylvania on February 20, 1920, I made the following statements:

I wish to make a casual reference to the use of biological products in their relation to abortion disease. As you probably know, with the exception of living cultures of abortion bacilli, injected subcutaneously before conception, such products have not given much promise.

Living cultures, emphatically, should be used only in infected herds under the guidance and close supervision of a qualified veterinarian. What the injection of such cultures may do in addition to the claims advanced by those who recommend their use, remains questionable, and should be made the subject of an exhaustive investigation.

And in a paper presented at the last annual meeting of the United States Livestock Sanitary Association I made the following statement:

An examination of the available data on the use of living cultures of abortion bacilli to secure immunity shows three things: One, that very few tests have been made under strict, experimental conditions; two, that the number of abortions among cattle that have received injections some time before conception drops with a noteworthy frequency to approximately 6 per cent, no matter what it may have been before immunization was attempted; and, three, that the number of abortions among treated is lower than among untreated cattle kept under the same conditions.

The last statement was based on the records published by investigators of whom it confidently may be assumed that their suspensions of live abortion bacilli were really alive and reasonably free from contaminations, and not on the experiences of persons who have attempted to immunize cows against bovine infectious abortion with alleged suspensions of live abortion bacilli of a viability and quality that they could not or did not test. The experiences of such persons, as most of us know, in our country at least, are oftener disappointing than encouraging, and seem to justify the belief that the available methods of vaccination against bovine infectious abortion commonly are useless, and not rarely dangerous or worse than useless.

I do not believe that the quoted statements require revision

¹ Presented at the University of Pennsylvania, February 28, 1922.

at the present time, or that it is necessary to supplement them with a lengthy tabulation of the available figures on the results obtained by different investigators with various preparations of living and dead abortion bacilli, used either alone or in combination with so-called antiserum. The data are as accessible to you as they are to me, and if you will study them as I have studied them, you probably will reach a conclusion not unlike the one I have reached, which may be expressed as follows:

Though it can not be denied that the injection, some time before the beginning of pregnancy, of live abortion bacilli into cows that are exposed to bovine infectious abortion markedly reduces the proportion of abortions among them, it is equally indisputable that the injection of cows with reputed but not proved suspensions of live abortion bacilli has given contradictory, far from satisfactory, and often wholly disappointing results.

This conclusion shows plainly that something is wrong somewhere; either the investigators have misled those who depend upon them for guidance and relief, or the material used in common practice must bear the blame.

In this paper, first, I will attempt to show that immunization against bovine infectious abortion is a peculiar problem, quite unlike immunization against other infectious diseases; second, I will call attention to a number of things that require consideration before the common use of abortion vaccines should be approved; and, third, I will state the results obtained by the application of a few simple tests to twenty-four samples of reputed or alleged suspensions of live abortion bacilli purchased on the open market. And, when I get through, I believe you will know what is wrong, and will have a fairly clear idea of the present status of vaccination against abortion disease among cattle.

PECULIARITY OF THE PROBLEM

The peculiarity of bovine infectious abortion is that it attacks an organ in the bodies of its subjects which is not constantly or continuously in existence, and that its subjects, when the intermittently existing organ is absent, are virtually immune against the disease. The immunity is not merely a mechanical phenomenon due to the absence of the organ through which the disease manifests itself, but a true immunity, be-

cause the prime causative microorganism of the disease does not seem to have the power to flourish in or to attack the continuously present organs of its subjects. The true habitat of the microorganism, and the real seat of its pathogenic activity, is the fetal envelope, and though it often enters and persists during varying periods of time in the udder, it does not seem to multiply abundantly in this organ and has not been proved to cause disturbances. As far as we know, everything that happens to the cow and the fetus when abortion disease occurs is consequent on the pathological changes in the fetal envelope.

After we recognize this peculiarity it will not be difficult to see that injections of abortion bacilli aim at the production of antibodies in an immune animal for the protection of a susceptible organ which is later to develop, and we will understand why it is important to time the injections with great care.

We may say that the body of a nonpregnant cow, which receives injections of abortion bacilli and subsequently becomes pregnant, is related to the fetal membranes in a manner that somewhat parallels the relation between a diphtheria antitoxin horse and the child that is protected through its antibody-enriched serum.

The thing that really has happened when a cow has been immunized against abortion disease is that she has become a reservoir of antibodies which are not needed for her safety, but which have the required potency to destroy abortion bacilli before they can reach her uterus, or, if they should reach her uterus during pregnancy, to prevent their rapid and profuse multiplication in the placenta.

That the antibodies rarely become excessively abundant, and can not be made so easily, we may infer from the frequent occurrence and often long persistence of abortion bacilli in the udders of infected and seemingly immune cows.

When the udder is infected abortion bacilli almost invariably are present in the supramammary lymph glands, and this implies that a stream of the bacilli flows from the infected udder into the body, where, assumably, they serve to stimulate the production of antibodies; but, notwithstanding this stimulation, the antibodies produced are not sufficient commonly to cause a rapid cleaning of the udder, or, as is shown by the frequent presence of abortion bacilli in the placenta of cows

which have infected udders but do not abort, to prevent wholly their penetration to and multiplication in the uterus during pregnancy.

Factors like this show why, in addition to carefully timing protective injections of abortion bacilli, it is reasonable to believe that either large or repeated doses are required to secure an effective immunity. And if we bear in mind that the induced immunity must last throughout nearly the whole period of gestation, or must not be too passive or short lived, we will understand why better results are obtained with live and virulent than with attenuated and dead cultures.

If my conception of the matter is true and if I have expressed myself clearly, you will agree with me that immunization against abortion disease, as it has the character of what we do to secure immunity against some other infectious diseases by injecting their subjects with an attenuated, innocuous virus, is very peculiar in that it requires the deliberate exposure of its subjects to massive doses of an unattenuated, fully virulent virus.

Add to this that cows injected with living abortion bacilli may become, through the infection of their udders, long persistent, dangerous carriers and disseminators of abortion bacilli, and you will see that the peculiar problem is burdened with serious complexities, which we should not ignore when we ask ourselves whether the use of the available methods of immunization against bovine infectious abortion can safely be given our approval.

THINGS THAT REQUIRE CONSIDERATION

Under this heading I shall not attempt to include all the things that require more consideration than they have received, but only several of those that impress me as being especially important, and among them the first is the strains of the abortion bacillus that may safely be used to make suspensions for the protective injections.

Recently Dr. W. E. Cotton, the assistant superintendent of the Experiment Station, and I had the opportunity to study three strains of the abortion bacillus derived from outbreaks of abortion among swine. One strain was obtained from Indiana, a second from Illinois and the third from California. The three strains in all their characteristics, like growth on

culture media, microscopic appearance, tinctorial character, sensitiveness to positive and negative abortion sera, etc., are undoubted Bang abortion bacilli. However, in their pathogenicity for guinea-pigs they are not wholly like any of the numerous strains of the abortion bacillus, isolated from outbreaks of abortion among cattle, that we have studied; and a particularly noteworthy fact is that the three swine strains, because of this difference in pathogenicity, resemble one another more closely than any one of the three resembles any strain isolated from cattle. The lesions caused in guinea-pigs are grosser in character; bone lesions are commoner; lesions often are caused in parts of the body in which the cattle strains have never been observed to cause lesions, like the development of post-orbital abscesses which lead to a forward pressing and the more or less rapid destruction of the eyeball, etc.

One of the swine strains has been proved to be a true abortion-causing organism for both swine and cattle, and this must be looked upon as quite important when we know that sows, as a rule, are strongly resistant against strains of abortion bacilli isolated from outbreaks of abortion among cattle.

As the three swine strains were obtained from three States, and as they are the only strains from outbreaks of abortion among swine that we have been able to procure, we can not dismiss their difference from cattle strains, in a character in which they closely resemble each other, as a matter of no significance, or as a peculiarity that probably will not be repeated in other strains from swine that may be studied in the future. It is wiser to assume that the evidence, though it may not be conclusive, indicates that the type of the Bang abortion bacillus that attacks both swine and cattle is more virulent for swine and guinea-pigs than the commoner type that apparently is restricted to outbreaks of abortion among cattle.

How about using strains of the abortion bacillus in the preparation of suspensions of mixed strains for the protective injection of cattle, like the described swine strains? Would it be fostering and facilitating the spread of a super- or multi-virulent kind of bovine infectious abortion that causes serious losses alike among swine and cattle?

The second thing that requires consideration is the medium in which abortion bacilli intended for use as a vaccine should be suspended.

Several years ago Dr. Cotton and I observed that abortion bacilli suspended in normal salt solution may rapidly lose their pathogenicity for guinea-pigs. We were too busy with other studies at the time to give the matter further consideration. Recently we recalled the observation and found on making further tests that suspensions of abortion bacilli in normal salt solution, kept at room temperature, occasionally show a greatly reduced virulence for guinea-pigs in 24 hours, and fail to cause lesions after 48, 72 and 144 hours. Similar suspensions kept at incubator temperature at times showed a marked reduction but not a total loss of virulence in 144 hours. The loss of virulence for guinea-pigs was accompanied by a loss of viability on culture media. The suspensions tested were made with five different strains of the abortion bacillus, hence the loss of virulence and viability is not attributable to the exceptional character of one unusual strain.

Suspensions of abortion bacilli in normal cow-blood serum and in blood serum from cows that react to serological tests for abortion at times showed a perceptible reduction but not a complete loss of virulence for guinea-pigs after 144 hours, and this is true alike of suspensions at incubator and room temperatures.

Why some suspensions, not all, in normal salt solution, at room temperature, not exposed to light, lose their pathogenicity for guinea-pigs and their power to multiply on culture media so rapidly, has not been determined. The number of tests that have been made is not sufficient to justify the conclusion that this is a common phenomenon, but it is of sufficient importance to require serious consideration, because we have no reasons to believe that dead abortion bacilli possess immunizing value, and we know that suspensions of abortion bacilli can not be marketed economically unless the interval of time between their preparation and use is much longer than a few days.

The third thing that requires consideration is the conditions under which the bacteria for suspensions are grown. From some observations made at the Experiment Station it seems that abortion bacilli grown in receptacles in which the air is rich in carbonic acid gas are not as readily or perfectly agglutinated by positive abortion sera as those grown in ordinary atmospheric air. Whether this is related to increased abundance and rapidity of growth in the presence of carbonic acid

gas has not been determined, neither has it been determined whether culture media of different kinds produce similar variations, or whether such variations are correlated with differences in viability, pathogenicity, immunizing value, etc.

Since the abortion bacillus is an exceptionally delicate organism which varies greatly in the effect of different, unknown conditions on its vitality, another matter that requires consideration is the containers in which suspensions should be dispensed. The containers used by commercial producers vary in size, shape and color, and those made of ordinary clear glass, if the abortion bacillus is as quickly killed by light as some other pathogenic bacteria, should be discarded at once.

Whether sufficient attention has been given to the age at which cultures for suspensions should be used, to the time that has elapsed since the cultures were isolated from a host, and to other matters of this kind, I doubt but am unable to say. But of this much I am convinced, that we lack much obtainable knowledge about the abortion bacillus which must be secured before immunization against bovine infectious abortion can be lifted out of the experimental stage.

Until we have obtained more knowledge I am inclined to believe that it will be almost necessary, in order to immunize cattle successfully against bovine infectious abortion with injections of suspensions of the abortion bacillus, that the living, undisturbed cultures of the bacillus should be sent to the locality in which the injections are to be made, and that the suspensions should be made in that locality, or near by, and used before they are many hours old. But what the final outcome of immunization will be, or what is needed to make it an economically practicable thing, I do not fully know, and if anyone else has the lacking information I am sure that it has not been published through agencies that have reached me.

SAMPLES OF COMMERCIAL SUSPENSIONS OF BOVINE ABORTION BACILLI

To inform ourselves in some measure about the quality and character of the alleged suspensions of live abortion bacilli, prepared and marketed by biological concerns in the United States, Dr. Cotton and I procured twenty-four samples through the Virus-Serum Control Division of the Federal Bureau of Animal Industry, and applied four relatively simple tests to them.

First, we made a microscopic examination of cover glasses prepared directly from the suspensions; second, we made cultures from the suspensions on media suitable for the growth of the Bang abortion bacillus; third, we made a microscopic examination of the growth that was obtained on the culture media; and, fourth, we tested the suspensions relative to their sensitivity to abortion-positive and abortion-negative blood-serum of cattle.

The suspensions from the different producers varied markedly in appearance; some were faintly and others heavily clouded; those from one producer were entirely clear but contained a heavy sediment; most of the containers showed some sediment; the dose varied from 5 to 20 cubic centimeters; the number of germs per dose was given in some instances but not in others; the return dates stamped on the labels were from two to three months later than the time at which the tests were made; consequently it can not be said that we were dealing with antiquated, out-of-date material; and the containers, as I have previously said, varied in shape, size and color.

The results obtained with the four tests are as follows:

Microscopic examination of cover glasses

Bacteria indistinguishable from Bang abortion bacilli.....	15
Slightly contaminated with other microorganisms.....	2
Grossly contaminated with various microorganisms, including streptococci and a large spore-bearing bacillus	7
Total number of samples.....	24

This simple test, if the presence of extraneous microorganisms in the two slightly contaminated suspensions is overlooked, requires the condemnation of 7, or 29 per cent, of the 24 suspensions.

Growth on culture media

Abundant growth, macroscopically indistinguishable from the growth of the Bang abortion bacillus.....	14
Very meager growth, macroscopically like the growth of the Bang abortion bacillus	3
No growth of any kind.....	1
Growth wholly unlike that of the Bang abortion bacillus.....	3
No cultures made because the microscopic examination of the suspensions showed so much contamination that cultures were deemed unnecessary	3
Total number of samples.....	24

If we omit the 3 suspensions from which no cultures were made, we have 1 that was worthless because it was entirely

dead, 3 that were worthless because they were nearly dead, and 3 that were worse than worthless because of the presence of a preponderance of extraneous microorganisms, or 7 among 21, or 33 $\frac{1}{3}$ per cent, that must be condemned.

If we add to the 7 the 3 that were found on microscopic examination to be too badly contaminated to require that they should be studied culturally, we have 10 among 24, or 41 $\frac{13}{20}$ per cent, of worthless suspensions.

Microscopic examination of growth on culture media

Microorganisms indistinguishable from Bang abortion bacilli.....	14
Same as above plus a few large cocci.....	3
Pure cultures of a large coccus.....	2
Miscellaneous assortment of bacteria.....	1
No growth of any kind.....	1
No cultures made because first microscopic examination of the suspensions showed excessive contamination.....	3
Total number of samples.....	24

This test absolutely condemns 3, or 15 per cent, of the 20 suspensions from which growth was obtained on culture media. Add to the 3 the 1 which failed to produce growth, and the 3 not cultured because of their gross contamination, and we have 7 among 24, or 28 per cent, of worthless suspensions.

Sensitiveness of suspensions to serum from abortion-positive and abortion-negative cows

Perfectly agglutinated by positive and not at all by negative serum.....	7
Poorly agglutinated by positive and not at all by negative serum.....	3
Poorly agglutinated by positive and more or less sensitive to negative serum.....	8
Suspensions containing so-called anti-serum, and which, therefore, could not be subjected to this test.....	6
Total number of samples.....	24

As this test was carefully checked with a standardized suspension of Bang abortion bacilli, regarding the quality of the positive and negative sera used, we may say, if we generously accept the 3 suspensions as satisfactory that were poorly agglutinated by positive serum but not by negative, that 8, or 44 $\frac{4}{5}$ per cent, of 18 are shown, let us put it mildly, to be of quite doubtful value.

We might stop here with the conclusion that the several tests show a pretty bad condition, bad enough to account for the contradictory and often wholly discouraging results that follow the use of commercial vaccines against bovine infectious

abortion. But as it is not entirely clear that the highest percentage of imperfect suspensions found with any one test is not the percentage found with all the tests, a few words more are required.

The suspensions which failed with one test are not in all cases those that were found to be imperfect with one or more of the other tests. For example, the one suspension that was found to be dead and the 3 that were found to be nearly dead with the cultural test were all 4 suspensions that were found to be perfect with the serum test, and, if we add these 4 to the 8 that were unsatisfactory with the serum test, we have 12, or $66\frac{2}{3}$, of 18 suspensions of very doubtful value.

Again, if we take the 6 suspensions that could not be subjected to the serum test because they contained so-called anti-serum, and know that 3 were found to be so badly contaminated with the first microscopic test that it was believed unnecessary to test them culturally, and that 3 tested culturally produced a growth macroscopically and microscopically unlike the Bang abortion bacillus, we may add them to the 12 suspensions designated in the last paragraph as of very doubtful value, and this gives us 18, or 75 per cent, of 24 suspensions of a quality that would inspire no discreet or judicious person to inject them into valuable cows as immunizing agents.

The real fact of the matter is that only 5 of the suspensions were found to be perfect with all four tests, and that means that 19, or 79.18 100 per cent, of the 24 ranged in value from doubtful to positively worse than worthless.

The suspensions were the product of five different concerns, and, as I do not wish to leave you with the impression that any one concern is producing a bovine infectious abortion vaccine of unvarying excellence, I will tabulate the results shown by the tests applied to the six suspensions obtained from the producer who made the best record.

Satisfactory with all four tests.....	2
Satisfactory with three tests but shown to contain only a few living organisms with the cultural test.....	2
Satisfactory with three tests but shown to be practically dead with cultural test	1
Satisfactory with two tests but shown to be dead with the cultural test	1
Total number of samples.....	6

If dead abortion bacilli were immunizing agents, which they

have not been proved to be, the suspensions made by this concern would be admirable. One-third of its product has no value; another third is of doubtful value; and what the value of the last third will be before the return date, two months after the date of the tests, is reached, I will leave to your judgment.

The conclusion I draw from the data I have presented can be written in less than a dozen words, as follows:

Vaccination against bovine infectious abortion disease is in the experimental stage.

LANTERN SLIDES OF FOOT-AND-MOUTH DISEASE

Several sets of lantern slides dealing with the dreaded foreign livestock plague, foot-and-mouth disease, have been prepared by the Bureau of Animal Industry, United States Department of Agriculture. They are for educational purposes and for distribution to regions from which symptoms resembling the plague are reported. The United States has been entirely free from foot-and-mouth disease ever since the last outbreak, which was stamped out in 1916. The very fact that the disease does not exist makes the symptoms unfamiliar to livestock owners and even to many State and local officials and veterinarians. The slides, 22 in number, show various symptoms of the malady and methods of combating it.

Foot-and-mouth disease recently has been causing heavy losses of cattle in western Europe, and the Department of Agriculture has prepared the slides as one more means of aiding in the suppression of infection should it by any chance slip past the rigid quarantine maintained against it. Meanwhile, the showing of the slides before livestock owners should be beneficial in acquainting them with the seriousness of the disease and in obtaining their cooperation in the event of need to slaughter infected animals for the good of the nation's livestock industry. The use of the slides by responsible persons can be arranged for by application to the United States Department of Agriculture, Washington, D. C.

Dr. E. A. Watson has returned to Ottawa after a visit to the Veterinary Research Stations at Lethbridge, Alberta, and Agassiz, B. C., Canada.

CYST-FORMING PROTOZOA IN REINDEER AND CARIBOU, AND A SARCOSPORIDIAN PARASITE OF THE SEAL (*PHOCA RICHARDI*)

By S. HADWEN

Chief Veterinarian, Reindeer Investigations in Alaska, Bureau of Biological Survey, United States Department of Agriculture

REINDEER, especially the older animals, are very commonly infested with Sarcosporidia. It is quite usual to find numerous cysts in the esophagus and other muscles of reindeer killed for meat, which otherwise seemed to be in the best of health and condition. On the other hand in post-mortems held on diseased or aged deer it was often found that the muscles were extensively invaded. In some cases the meat was so altered that it could not have been passed for food. The distribution of Sarcosporidia throughout the body is uneven, certain parts being more infested than others. It is probable that the shape and size of the cysts may vary according to the tissues in which they occur, but the spores themselves also differ in size and appearance. Therefore the microscopical differences of both cysts and spores are briefly given and a new species is described under the name of *Fibrocystis tarandi*.

SARCOCYSTIS OF THE HEART

In several post-mortems the endocardium showed a spotted appearance. The cysts were so numerous in some cases that the lining had a grayish look. When the muscles were teased apart, the cysts showed as transparent sacs which could easily be picked up on the point of a needle. The cysts averaged 0.433 mm. in length and 0.168 mm. in width. (Fig. 8, 1) This is less than the measurements of those found in the esophagus. The spores measure 16 microns in length by 7 microns in width and are larger than the esophagus form. The ease with which heart cysts can be isolated from the muscles is due no doubt to the histological structure of the fibers. When a little pressure is applied the cysts slip out easily. In the esophagus it is very different and the cysts often show a spiral appearance on section, being more firmly inclosed by the muscle

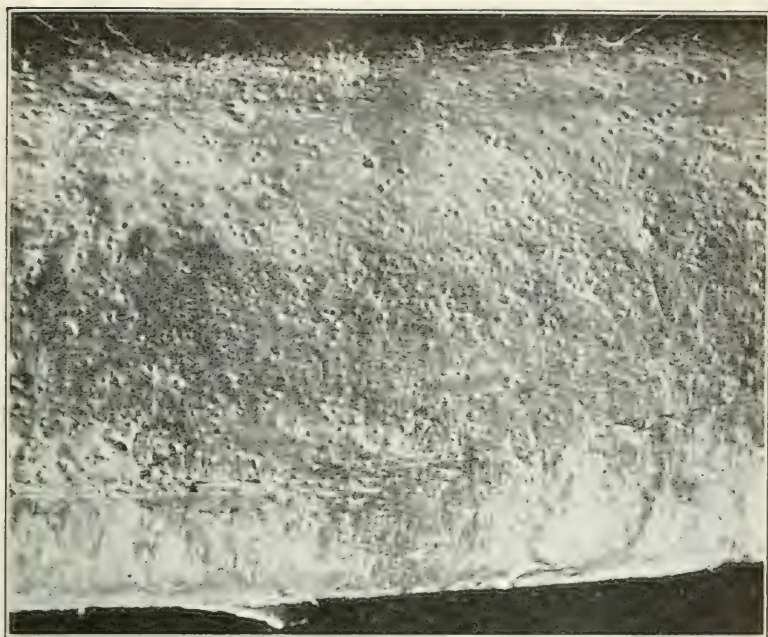


Fig. 1.—Pits in bone made by cysts of *Fibrocystis tarandi*. (X 2)



Fig. 2.—Cysts in periosteum. *Fibrocystis tarandi*. (X 2)

fibers. The heart cysts appear straight in outline but have small wrinkles on their surface.

SARCOCYSTIS IN THE ESOPHAGUS AND OTHER MUSCLES

The cysts look very similar to *Sarcocystis tenella* of sheep. The average length is 0.868 mm. and the width 0.137 mm. The longest cyst found was 2.25 mm. The spores measure 10 microns in length and 4 microns in width. (Fig. 8, 2.) In section from the esophagus the cysts tend to curl and often have a corkscrew appearance. On one or two occasions "rice grain" cysts resembling *Balbiania* were encountered. These showed the partitions which have been taken as a character separating this genus from *Sarcocystis*. Authorities are now mostly agreed, however, that the *Balbiania*-shaped cysts in sheep are due to *S. tenella*. The situation in which most of these cysts were found in reindeer was deep in the muscles, especially over the periosteum of the flat bones such as the scapula, where the muscles have a direct attachment. The spores from the *Balbiania*-like cysts seem similar to those of the esophagus and voluntary muscle forms.

FIBROCYSTIS TARANDI SP. N.

Reindeer owners have noticed an affection called by them "corn-meal disease" which attacks the deer in some of the herds. The appellation is on account of the granular nature of the lesions suggesting the gritty feel of coarsely ground meal. The cysts occur in the fibrous connective tissues, especially in the periosteum and on the surface of the tendons. (Fig. 2.) In a heavily infested caribou killed near Ophir, Alaska, all the bones examined showed cysts, even the mandibles. Where the bones were deeply covered by muscles, such as the tibia, the cysts were noticed only on the antero-internal side, which is only covered by the skin, and on the posterior aspect of the bone none were found. The cysts of the periosteum were mostly under the surface next to the bone, and after the periosteum was stripped off small pits were found in the cancellated tissue which corresponded with the position of the cysts adhering to the periosteum. The pits are undoubtedly the result of pressure. (Fig. 1.) The periosteum being nonelastic places the cysts under considerable strain. On the outside of the tendons similar pits were also noted.



Fig. 3.—*Fibrocystis tarandi* in periosteum. (X 9)

In reindeer the parasites seem to be identical with those found in the caribou. One case was discovered in a herd near the mouth of the Yukon, and a number of additional cases are reported from other herds. In the two cases which were examined the cysts were so numerous that the flesh was depreciated in value and could not have been sold.

The Cyst

The diameter of the cysts averages about 0.275 mm., the smallest being 0.1 mm., the largest 0.45 mm. They are generally round, but when several are packed closely together they may show flat sides or become elongate. The cysts have three coats, an outer, thick and fibrous, with a concentric arrange-

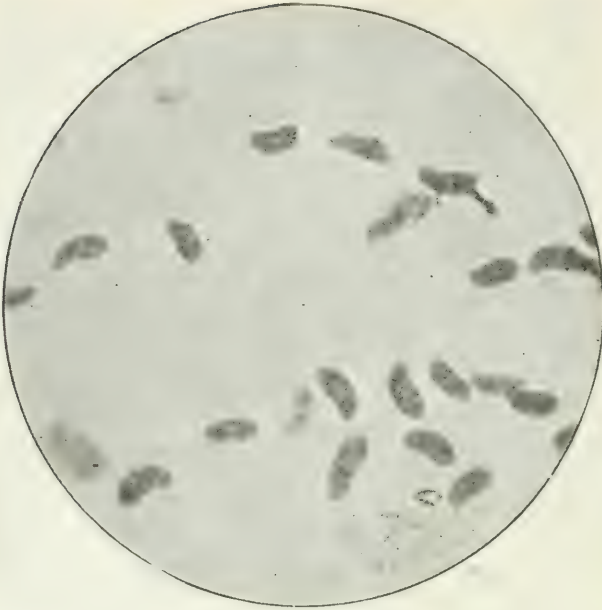


Fig. 4.—Spores of *Sarcocystis* of reindeer from heart muscle. (X 540)

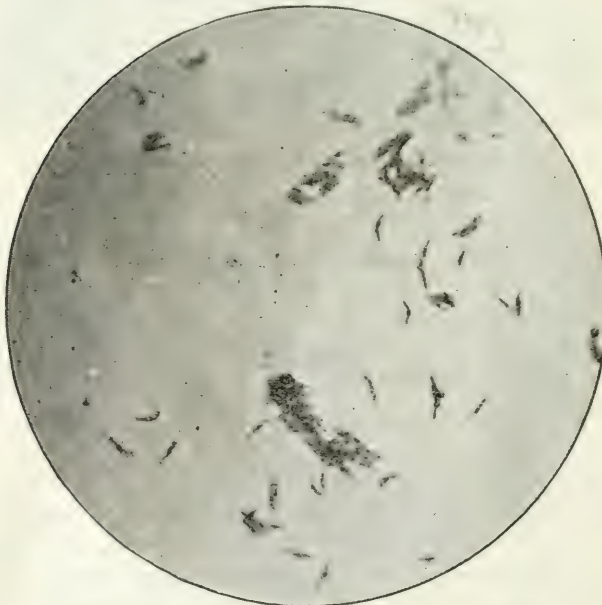


Fig. 5.—*Fibrocystis tarandi* spores. (X 540)

ment of fibers, a clear hyaline ring and an inner lining which surrounds the spores. (Fig. 3.) In having three coats the cysts differ from Sarcosporidia which have only one protective covering. If a piece of the periosteum is stripped off the bone and then is scraped, the cysts may come out of the outer shell which will be left imbedded in the fibrous stroma of the periosteum. The intermediate covering of the cyst is of a transparent nature and in the accompanying illustrations (Fig. 8, 4) they can be seen as clear rings surrounding the cyst. The cysts are apparently not attached to the outer coats by processes, as it is easy to free them. In unstained material the interior of the cyst is dark brown in color.

The Spore

In alcoholic material the average length of the spore is 7 microns and the width 1.75 microns. (Fig. 8, 3.) There is a well-defined nucleus which is nearly central. The spores are spindle shaped and do not show a polar cap like Sarcosporidia. Small granules occur in the endoplasm. In groups of spores which are packed together the arrangement is such that the nuclei of alternate spores form regular rows. The cyst formation and the shape of the spores recall the forms described by Gilruth and Ball from the intestine of the kangaroo. The name *Fibrocystis* is based on the location of the cysts.

THE PROBABLE EFFECT OF THE PARASITES ON REINDEER AND CARIBOU

The massive infections found in the two cases examined leave little doubt that the animals were adversely affected. The pits in the bones are suggestive of pain, and as the tendons and sheaths are likewise affected it is evident that if they undergo calcification they would cause trouble. It is probable that in addition to mechanical effects the parasites may also cause injury by their secretions and excretions.

SARCOCYSTIS IN SEALS (*PHOCA RICHARDI*), *SARCOCYSTIS* *RICHARDI* SP. N.

Two seals were examined in December, 1920, at Unalakleet, Alaska, and Sarcosporidian cysts were found in both animals. In one, the muscles of the diaphragm contained a number of long cysts. (Fig. 7.) The average length of seventeen cysts

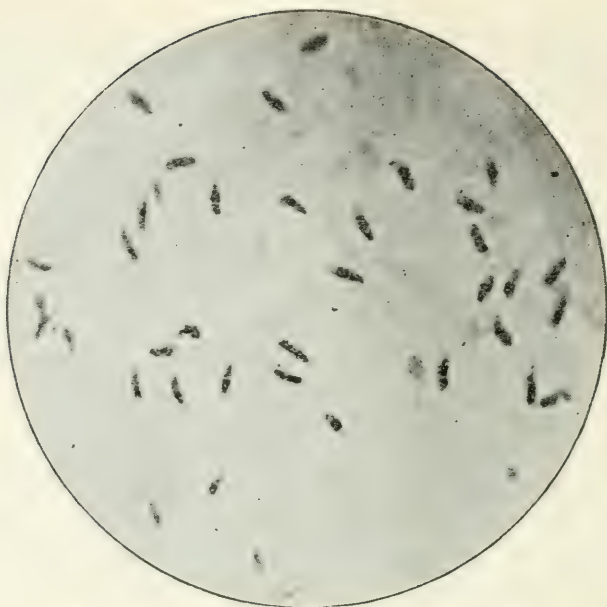


Fig. 6.—Spores of *Sarcocystis richardi*. (X 540)

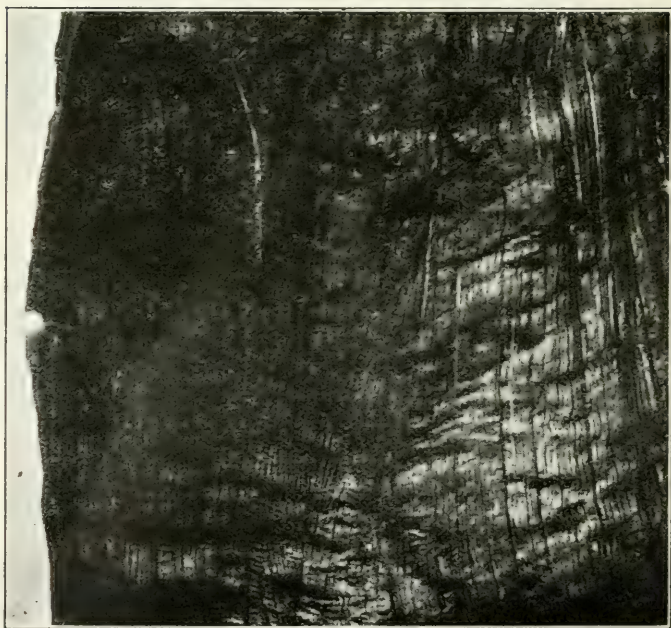


Fig. 7.—Cysts of *Sarcocystis richardi* in muscles of diaphragm. (X 2)

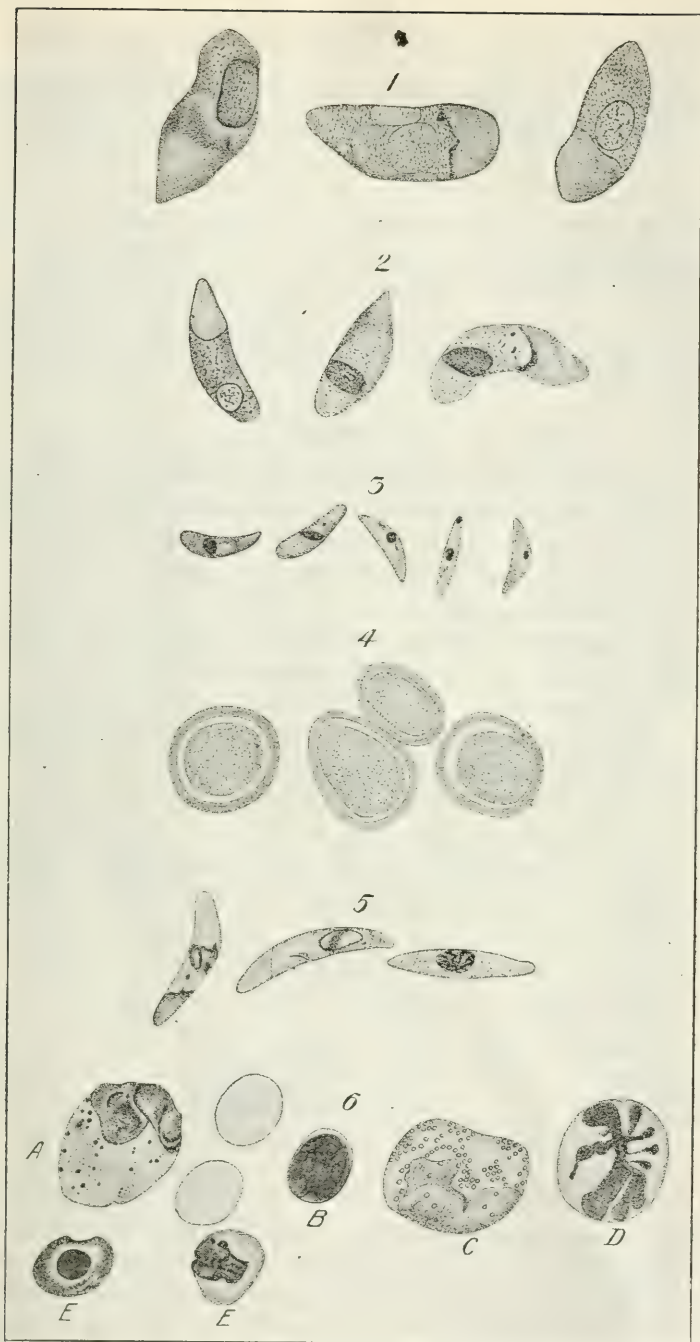


Fig. 8.—1, Spores from heart muscle. 2, Spores from Balblania-like cysts. 3, Spores of Fibrocystis tarandi. 4, Cysts of Fibrocystis tarandi. 5, Spores of Sarcocystis richardi. 6, Blood from seal. A, Basophile; B, Lymphocyte; C, Eosinophile; D, Neutrophile; E, Nucleated red cells.

was 1.2 cm. The three longest measured over 2 cm. in length. The average length of the cysts at once suggests that they are different from those found in the domestic animals. According to Railliet, the longest cysts observed in cattle measured 1 cm. in length. Minchin says *Sarcocystis tenella* in sheep reaches a length of 16 mm. The spores average 10 microns in length by 2.5 microns in width. (Fig. 6.) As Sarcosporidia are classified largely according to their hosts, it seems warranted to suggest the name of *Sarcocystis richardi* for the seal parasite. (Fig. 8, 5).

SEAL BLOOD

Smears made from the heart blood of the seals showed a high percentage of eosinophiles. Large numbers of eosinophiles have been noticed in heart muscles infested with Sarcosporidia in other animals, and it is probable that these cells act in a defensive manner against them. In addition to Sarcosporidia, the seals harbored a large number of a species of *Acanthocephala*; perhaps the eosinophiles were more numerous on account of its presence. It is interesting to note that the seal eosinophiles have rather large granules which may be described as intermediate in size between those of cattle and those of horses. The mast cells have few granules and these are correspondingly large. In one of the seals (No. 2) there was a definite anemia. Nucleated red cells were noted with polychromomania and punctate degeneration. Fig. 8 (6) illustrates the condition.

DIFFERENTIAL COUNTS

Seal 1		December 4, 1920	Seal 2	
Mononuclears	16	Mononuclears	48	
Polynuclears	42	Polynuclears	23	
Eosinophiles	38.5	Eosinophiles	16.5	
Mast cells	3.5	Mast cells	12.5	

Dr. A. W. Whitehouse, Professor of Anatomy in the Veterinary Department of the State Agricultural College at Fort Collins, Colo., who is on a year's leave of absence studying for the degree of M. R. C. V. S. at the Veterinary Department, University of Liverpool, has recently been offered and has accepted the position of Director of Studies and Professor of Anatomy at the Glasgow Veterinary College, Scotland.

SARCOSPORIDIOSIS OF SWINE, ASSOCIATED WITH ADVANCED DEGENERATIVE CHANGES IN THE MUSCULATURE

By G. T. CREECH

*Pathological Division, United States Bureau of Animal Industry,
Washington, D. C.*

IN PRESENTING this paper on sarcosporidiosis of swine it is the intention of the writer to record briefly certain observations that have been made in a number of cases of heavy sarcosporidial infections in swine, in which there were also well-marked alterations in the musculature of the affected animal, as encountered from time to time in the regular routine of diagnostic work at this laboratory.

Sarcosporidia, which were first observed in the muscles of mice by Miescher in 1843, are now known to be of common occurrence in the domestic animals; and notwithstanding their early discovery, little is yet definitely known regarding the life cycle of these microparasites. Smith (1) succeeded in transmitting sarcosporidia in mice by feeding infected muscle tissue. Nègre (2), whose experiments have been repeated by Crawley (3) with similar results, has proved that the feces of mice that have been fed with muscle tissue infected with sarcosporidia are infective for other mice between the fifteenth and sixtieth days after feeding. While transmission experiments in the larger animals have given either questionable or negative results thus far, yet the results obtained by Nègre and Crawley point to the possibility of herbivorous animals infected with sarcosporidia through the medium of herbage, water, etc., contaminated by the feces of carnivorous animals which have devoured infected meat, the parasites passing through developmental stages in the epithelial cells of the intestines of the host, involving the production of spores, which pass out of the body in the feces.

The frequency of occurrence of sarcosporidia seems to depend somewhat upon the particular species of animal affected. According to Minchin (4), sarcosporidia "are nearly always to be found in the pig and sheep." The observations made by zoologists in this country, particularly with regard to sheep,

tend to bear out this statement. As to the occurrence of sarcosporidia in pigs, Bergman (5) found 8,498 cases of sarcosporidiosis in pigs in Sweden out of a total of 27,751 animals. Neumann (6) states that sarcocysts in the pig "are very frequent—at least in certain countries and at certain periods." Though sarcosporidia may be especially common in sheep and swine, they are by no means rare in cattle and horses.

In the consideration of the frequency of occurrence of sarcosporidia it might be well to mention that in a large percentage of cases they occur only in limited numbers with no apparent harmful effects resulting from their presence in the tissues. Only those cases will be considered in this paper in which the parasites were present in large numbers in the muscle tissues and which were associated with well-marked pathological changes, particularly those of degeneration.

The encountering of so many cases in which the limited numbers of parasites present had caused no apparent alterations of the tissues has led certain investigators to the conclusion that sarcosporidial infections seldom result in damage to the invaded tissues. Edelmann (7) says: "The very fact that the presence of Miescher's sacs in the muscles does not irritate the latter, nor produce any symptoms of disease in the animals, would lead us to conclude that they are harmless parasites." Darling (8) in writing of sarcosporidia encountered in Panama states that according to his observations these parasites displayed little or no evidence of having induced any tissue reaction, and that sarcosporidial infection, though common, "probably has very little pathogenic significance or economic importance." He thinks that the reason so little light has been thrown on the subject of sarcosporidiosis is due to this more or less common view that sarcocysts are not pathogenic and are of doubtful economic importance.

There are others who hold similar opinions, notwithstanding the fact that literature records a number of cases in which the affected animals not only exhibited symptoms indicating muscular involvement, but on microscopical examination of the musculature of such animals well-defined pathological changes were noted, with excessive numbers of sarcosporidia present. Oster-tag (9) and others describe cases of sarcosporidiosis, particularly in cattle, in which there were symptoms of lameness. Certain

muscular changes were noted on postmortem examination, and microscopically large numbers of Miescher's sacs were seen. In one of these cases there was paleness, loss of striations and granular disintegration of the muscle fibers.

Watson (10) describes symptoms and lesions of sarcosporidiosis in cattle and horses and concluded that "the parasite sarcocystis under certain conditions becomes a very important factor in disease, invading the entire musculature of its host, with serious or fatal consequences."

McGowan (11) found large numbers of sarcosporidia in European sheep affected with "scrapie" and believed them to be the cause of this disease. However, his findings have not been confirmed by other European investigators.

According to Minchin (4), sarcosporidiosis is sometimes the cause of fatal epizootics among domestic animals. He mentions paralysis of the posterior extremities as one of the symptoms of this condition in hogs.

Virchow (12) mentions feebleness, or intermittent paralysis, among the symptoms observed, in a number of cases of sarcosporidiosis of the pig which came to his notice.

Other authorities besides those mentioned are also of the opinion that sarcosporidia may at times prove harmful to their host, especially in heavily infected cases.

DESCRIPTION OF CASES EXAMINED

The cases of sarcosporidiosis in swine which have come under the observation of the writer have been confined largely to specimens of the so-called "soft" or "mushy" hams, more particularly cooked hams from meat-packing establishments in different sections of the country which have been forwarded by Government inspectors for a laboratory diagnosis.

Prior to cooking, these sarcosporidial hams, with an occasional exception, show only slight gross changes, such as a possible softening or flabbiness of the muscle tissue, which may also appear somewhat paler than normal. If the changes referred to are only slight they may be easily overlooked by the meat inspector in his routine inspections of the hams during the course of their preparation, and the "mushy" condition becomes apparent only after the affected hams have been subjected to the cooking process. Even after cooking, the true condition

of the ham may not be detected until after it reaches the retailer, owing to the fact that boiled hams are frequently "boned" and wrapped, sometimes with cloth, which to a large extent precludes the possibility of detecting the "soft" condition until after the interior has been exposed through slicing, etc. Occasionally such specimens are returned to the packer and eventually reach this laboratory for a determination of the nature and cause of the softened condition.

These hams come from lots that have been cured and handled in the regular way, and this tendency of an occasional ham to "fall to pieces" has in the past been attributed to different causes, such as overcooking, etc. The process of disintegration is quite marked in some specimens. The muscle tissue of a number of the hams examined presented the appearance of having been passed through a meat chopper. In all the specimens of cooked hams that have been received there has been more or less variation in the extent of this disintegrated condition. The few uncooked hams that have been received exhibited a soft or spongy condition of the muscle tissue and were quite pale in color.

HISTOLOGICAL APPEARANCE

Some fifteen cases have been examined histologically, and while it may be said that there were variations in the extent of the lesions and the number of parasites present, yet there were certain outstanding changes noted which were common to all. This refers particularly to the very marked degenerative changes, atrophy, etc., which were present in a greater or lesser degree in all cases examined.

In the first case examined difficulty was experienced in finding pieces of muscle still intact sufficiently large for sectioning. Sections from this specimen showed the musculature to be heavily infected with sarcosporidia. The parasitic invasion was accompanied by a myositis, the leucocytic infiltrations surrounding the degenerated parasites consisting largely of eosinophiles. There was also a very marked degeneration and atrophy of the muscle fibers (Fig. 1).

In other cases, in which there was a more extensive involvement of the muscle tissue in the degenerative process, practically all of the muscle fibers were affected, showing more or less dissolution of continuity, while many of the fibers had under-

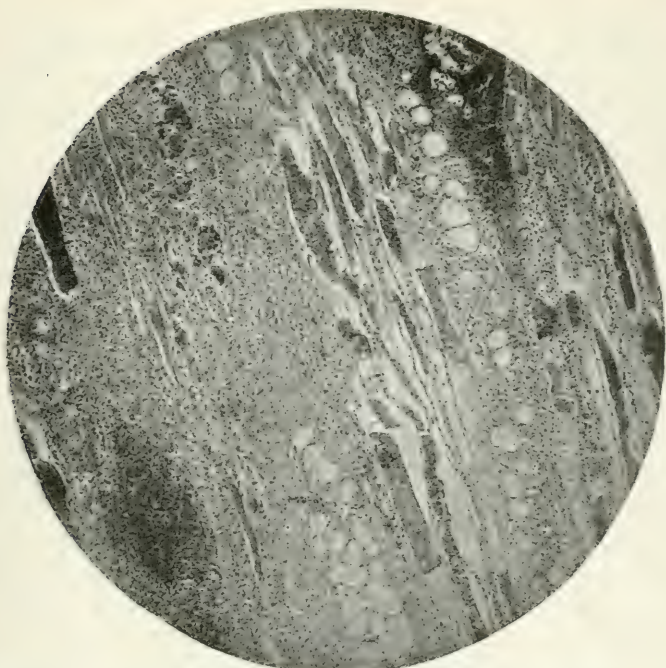


Fig. 1 (Case 0054)—Inflammatory changes caused by sarcosporidia. The leucocytic infiltration surrounding the degenerated parasites consisted largely of eosinophile cells. (X62)

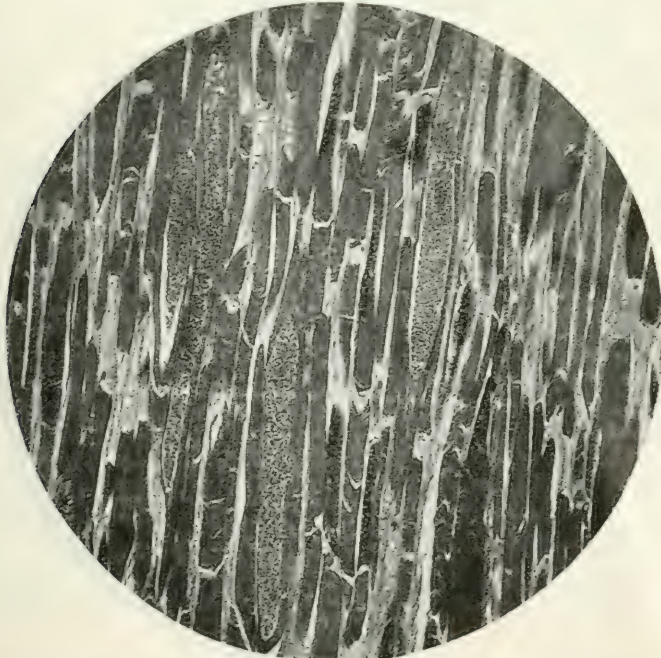


Fig. 2 (Case 2505)—Unusually well marked muscular degeneration, as evidenced by unstained portions of muscle fibers. (X62)

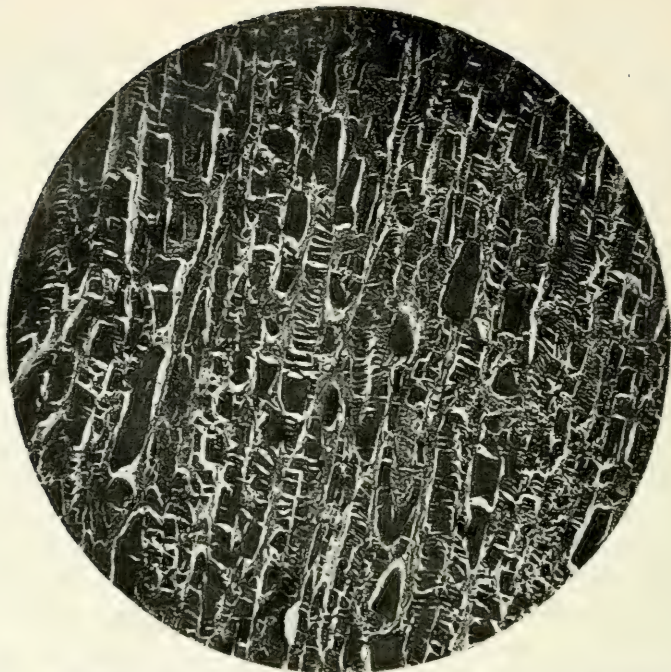


Fig. 3 (Case 2558)—Extensive involvement of musculature in degenerative process. Note ruptured sarcocysts, contents of which are intermixed with fibrillar debris. (X62)



Fig. 4 (Case 7814)—Cross section of muscle showing extensive involvement

gone complete granular disintegration (Fig. 2). In a number of these cases the breaking up of the fibers had evidently been accompanied by the rupturing of many of the sarcocysts, the contents of which could be seen intermixed with the protoplasmic débris (Fig. 3).

In some instances the sarcocysts appeared to be in varying stages of development, showing little evidence of degeneration, while in other cases a large percentage of the parasites were undergoing degeneration, many of the cystic chambers containing only a granular detritus. In a few instances calcification was noted in the older lesions.

CAUSES OF ALTERATIONS IN THE AFFECTED MUSCULATURE

Authorities seem to differ somewhat in their opinions as to the effect produced by excessive sarcosporidial invasions of animal tissues. In all such cases there is doubtless at first a certain amount of irritation, but tissue reactions, as evidenced by inflammatory changes, were noted in only a very few cases. Consequently the question arises as to what caused the marked degeneration of the muscle fibers which was observed in all cases examined.

The opinion is held by some that sarcosporidiosis accompanies other conditions or diseases which have left the animal in a depleted condition, and that the parasitic invasion of the tissues follows as a natural sequence, because of the lowered resistance of the animal.

On the other hand there are authorities, some of whom have already been quoted, who are of the opinion that sarcosporidia are capable of inducing definite tissue changes in their host, not only because of their presence, but, according to some, the parasites secrete a toxin, which may prove very damaging to the tissues, particularly the muscles, and possibly the nervous system as well.

Laveran and Mesnil (13), following observations made by L. Pfeiffer (14), succeeded in obtaining a toxin from sarcosporidia of sheep which they called "sarcocystin." This substance proved to be very toxic for rabbits (a tenth of a milligram of the dried extract being fatal), and less so for other experimental animals. Their work has been confirmed by other investigators.

Minchin (4) says: "Many observations tend to show that

the dangerous effects of the sarcosporidian parasite are not caused merely by the disturbances which they set up in the tissues of the host, but are due to an active poison secreted by the parasite itself."

In most of the cases examined by the writer there was little evidence of tissue reactions; and while definite proof was lacking, yet it would seem reasonable to assume that the marked alterations noted in the muscle fibers may have been caused by some toxic substance slowly eliminated by the numerous sarcocysts present in the musculature.

FREQUENCY OF OCCURRENCE IN SWINE

Efforts to obtain information with regard to the frequency of occurrence of these heavily infected cases of sarcosporidia in swine have thus far met with little success. No definite data were obtainable from the larger packing establishments, which it may be said was due mainly to the methods of handling the hams at the time they are subjected to the cooking process, and to the fact that the lesions in some cases are not very noticeable in the gross specimen. Therefore it is not possible at this time to make even an approximate estimate of the actual number of hams so affected. From one small establishment it was reported that approximately from one to three "soft" hams were encountered out of every fifty. If it be conceded that this soft condition in hams is practically always associated with sarcosporidiosis, and should the above ratio prevail in the larger packing establishments, it would mean that a very much larger percentage of hogs harbor this parasite in excessive numbers than has been suspected heretofore.

IMPORTANCE FROM A MEAT-INSPECTION STANDPOINT

Smith (1) refers to several cases of sarcosporidiosis that have been observed in man, but there has been no evidence presented anywhere in the literature showing that sarcosporidia of the lower animals may be transmitted to man, either through the consumption of meat containing the parasites or otherwise.

Ostertag (9), in rendering judgment with regard to meat infected with sarcosporidia, says it has been proved that these parasites are of rare occurrence in man, and is of the opinion that, because of the fact of their occurrence in food animals,

"it can not be assumed that sarcosporidia can be transmitted to man by eating meat." The possibility of transmission of the parasites to man being rather remote, then the disposition of meat containing excessive numbers of sarcosporidia should depend largely upon its food value and the presence or absence of toxic substances. Ostertag and other authorities on meat inspection agree that in those cases of sarcosporidiosis in which the meat shows noticeable alterations, such discoloration, or a watery condition of the musculature, it should be considered highly unfit for food. Therefore, such meat should be excluded from the market, not only because of its appearance, but more especially because of its greatly diminished nutritive value. It is the opinion of the writer that beyond the consideration of the poor food value of such meat, the fact that in many such cases the muscle tissue is so thoroughly permeated with the sarcosporidia is sufficient to render the meat of such carcasses more or less noxious from a meat-inspection standpoint, more especially because of the possibility of injurious toxic products eliminated by the parasites.

CONCLUSIONS

According to observation made in the various cases examined there are certain alterations of the musculature, particularly degenerative changes, which always accompany heavy sarcosporidial infections in swine.

Owing to the nature of the lesions it can not be stated definitely whether such alterations were due to the excessive number of sarcosporidia present or to some other etiological factor. However, the writer is of the opinion that the possibility of deleterious effects resulting from toxic products which may possibly be eliminated by the parasites should not be overlooked.

Owing to the lack of proper data on the subject it is not possible to reach any definite conclusion with regard to the economic importance of sarcosporidiosis in swine. However, the somewhat limited amount of available information would seem sufficient at least to justify the conclusion that these advanced cases of sarcosporidial infection occur more frequently in swine, and cause more damage to the invaded host, than has heretofore been recognized.

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INVITATIONS TO WORLD DAIRY CONGRESS SENT OUT

Invitations to send delegates to the World's Dairy Congress. to be held in the fall of 1923, have just been sent by President Harding to the Governments of about 50 foreign countries. A united effort is being made by all branches of the dairy industry in this country to make the meeting a success. The United States Department of Agriculture is cooperating with the World's Dairy Congress Association in every way possible, and many department men are doing active work on committees in making preparations. The place of meeting has not yet been selected.

Eminent authorities from all parts of the world will take part in the program, which is designed to touch on every phase of the industry from production to consumption that will be of interest to the people of many countries. The selection of speakers and topics is in the hands of a general program committee, headed by L. A. Rogers, director of the dairy research laboratory of the B. A. I. The four-part program tentatively decided upon will embrace research and education, industry and economics, regulation and control, and national health.

A NOTE ON THE PERIOD OF INCUBATION IN HOG CHOLERA

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THE USE of large numbers of hogs for the production of hog-cholera virus has afforded a means, already utilized by some,¹ for improving our knowledge of the disease hog cholera. One of the features of that disease concerning which we have little precise recorded data is the period of incubation. It is true that we may find statements in the literature concerning the length of the period of incubation in hog cholera, but these statements are not always in agreement, and it is furthermore apparent that they are generally based upon field observations rather than upon closely controlled experiments. The true period of incubation is the time elapsing between infection and the appearance of symptoms, but since the time of exposure by contact does not necessarily coincide with the time of infection, we may be led to erroneous conclusions by field observations. It is also true that the period of incubation may be influenced by a number of factors, such as the mode of infection, the resisting power of the animal and the invasive power of the virus. Since the length of the period of incubation may be influenced by these and perhaps other factors, we must expect reasonably wide variations in field observations, and to a certain extent also even in carefully controlled experiments.

The purpose of this note is to present data concerning the period of incubation in a limited number of pigs exposed to hog cholera. The data were kindly furnished by Dr. W. B. Niles. The pigs used were all obtained from farms in the vicinity of Ames, Iowa, and before purchase careful inquiry was made to make sure that the pigs were from susceptible stock and that they had not been exposed to cholera prior to purchase.

All pigs were exposed to cholera by the injection of defibri-

¹ Craig and Whiting. Bulletin 173, Purdue Univ. Expt. Sta., March, 1914.
Hoskins, H. Preston. Jour. Amer. Vet. Med. Assoc., vol. 49, No. 6, p. 817. Sept., 1916.

nated virus blood subcutaneously into the loose tissues of the flank, the dose being 5 c.c. in most instances. In a few cases only 2 c.c. was injected, but as shown by Hoskins² and repeatedly observed by us, such variations in dose are without effect upon the course of the disease.

The observations are summarized in the accompanying table.

RESULTS FOLLOWING INOCULATION OF 171 PIGS WITH HOG-CHOLERA VIRUS

Time of observation after injection	Per cent showing first rise in temperature	Per cent showing first visible symptoms	Per cent off feed	Per cent died or killed for virus ¹
2d day (48 hrs.).....	2.3	0	0	0
3d day (72 hrs.).....	26.0	2.9	1.7	0
4th day (96 hrs.).....	48.5	50.8	11.2	0
5th day (120 hrs.).....	11.8	30.4	60.0	0
6th day (144 hrs.).....	7.1	14.0	17.0	1.2
7th day (168 hrs.).....	3.5	1.75	7.0	47.6
8th day (192 hrs.).....	0.6	....	2.35	11.7
9th day or later.....	....	....	1.2	33.5

¹ 5.8 per cent recovered.

Before undertaking a discussion of this table, a few words of explanation are desirable. This table has been prepared from the records of 171 shoats which varied from 50 to 70 pounds in weight. The first column is self-explanatory. The second column gives the percentage of pigs which first showed an appreciable rise in temperature on the various days of observation. This increase in temperature was not always sufficiently marked alone to indicate that the disease process had begun to manifest itself, but the temperatures recorded on previous days enabled the observers to note a distinct rise above the prior level on the days indicated. Column 3, which is headed "First visible symptoms," shows the percentage of pigs which exhibited the first visible signs of a departure from the normal state of health on the different days of observation. The symptoms consisted merely of slight sluggishness or "slowness" and slight loss of appetite. These physical examinations were made by men of long experience who were accustomed to examine these and other pigs daily for symptoms of disease, and the symptoms detected by them might have been overlooked by inexperienced observers. The fourth column includes pigs which, on the days indicated, took little if any food. It will be noted that the fifth column gives the percentage of the pigs that died or were killed on various days. This column is introduced merely to serve as a sort of index of the virulence of the virus. It

² Loc. cit.

is not intended to show that the virus was virulent enough to cause the death of more than 60 per cent of the pigs before the end of the eighth day, because a very large part of the pigs that are recorded as dead on the eighth day were killed so that their blood might be used in other work. On the contrary, the fact that 5.8 per cent of the pigs recovered indicates that the virus was merely of good average potency. This is emphasized by the fact that every one of the 171 pigs showed symptoms of disease after inoculation. The recovery of nearly 6 per cent (and this figure might have been increased had none of the pigs been killed) of 171 pigs, proved to be susceptible, certainly does not indicate excessive virulence.

With respect to the period of incubation in these pigs, it seems that the temperature alone should not be used as a measure, for, as already explained, the rises of temperature recorded in the table mean merely elevations above the average normal, and since the normal temperature of hogs is subject to such wide variations, we can not be sure that in any given case a rise in temperature may not have been due to some disturbing influence other than the virus of hog cholera. The temperature may, however, prove useful as an adjunct to the physical examination.

Adopting the time of the appearance of visible symptoms as the end of the period of incubation, we find from our table that the shortest period was three days, observed in 2.9 per cent of cases, while the longest period was 7 days (1.75 per cent of cases). In more than 95 per cent of the pigs the incubation period ended on the fourth, fifth or sixth days.

It is coming to be recognized that successful immunization of hogs against cholera is primarily dependent upon the employment of a good grade of potent virus, first by the serum manufacturer in hyperimmunizing his hogs and in testing his serum, and second, by the veterinarian who is administering the simultaneous treatment in the field. The suggestion is made, therefore, that careful observation of the period of incubation of the disease in pigs inoculated to secure virus for any of these purposes may assist manufacturers in maintaining a virus of high grade.

The data here reported suggest that a virus which, after subcutaneous injection, causes visible symptoms in any considerable proportion of pigs before the fourth day is probably either of

exceptional virulence or that it is contaminated. In either case it may cause the death of hogs that are hyperimmunized with it. The early symptoms may of course result from prior infection with the virus of cholera or with other disease-producing agents, but even in such an event the use of the virus produced by pigs which sicken before the fourth day may prove disastrous.

Our table also suggests that to obtain the best results, *i. e.*, the most potent serum, an adequate test of the serum and a virus that will confer a lasting immunity when used simultaneously with serum, the virus used for these purposes should produce the first symptoms of disease on or before the sixth day. It is of course true that slow development of the disease may be caused by exceptional resistance of the pigs, but we then merely transfer the fault from the virus to the pigs, for it can not be maintained that exceptionally resistant pigs are suitable for the production of virus or for the testing of serum.

It is believed that hog-cholera virus which will produce visible symptoms and a rise in temperature in 50 per cent or more of susceptible pigs on the fourth day after subcutaneous injection, and which has the power to cause progressive disease so that a considerable majority of the pigs are "off feed" on the fifth day, will produce good serum, will give a reliable serum test and will result in a lasting immunity when properly administered with anti-hog-cholera serum. It is questionable whether a virus which does not, after subcutaneous injection, produce symptoms of disease in the great majority of susceptible pigs before the seventh day is fit for use in producing or testing serum or in administering the simultaneous treatment.

We are just in receipt of a copy of a report of the Australian Veterinary Association which was forwarded through the kindness of M. Henry, the Secretary. It is interesting to note in the proceedings that one of the speakers, Professor H. A. Woodruff, M. R. C. V. S., reports that the American Veterinary Medical Association "has been an inspiration to so many of us in the formation of this body, the Australian Veterinary Association."

AVIAN TUBERCULOSIS ¹

By A. F. SCHALK

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TUBERCULOSIS in its general application is pre-eminently the "watchword" of the hour in the animal-disease world to-day. Never before in history has any animal-disease condition been given such widespread publicity, the systematic propaganda and the financial support for its control and suppression as is accorded to animal tuberculosis at the present time. The motive is humane and unselfish. The endeavor is earnest and sincere, and the results, I firmly believe, will be the goal we have set out to accomplish, i. e., the ultimate eradication of this dreaded disease.

Alongside of this tremendous problem in animals, its sister disease, avian tuberculosis, is springing up with alarming rapidity in fowls, particularly in our northern country.

The nation's annual poultry production is valued at slightly less than \$1,500,000,000. Since this produce constitutes one of the most nutritious and dependable commodities of human food, and avian tuberculosis is making great inroads into the industry in many localities, it might be well for us as sanitarians to give this disease most serious consideration in connection with tuberculosis in cattle and swine.

As a matter of history, avian tuberculosis has not been investigated until quite recently. Most researches have been conducted since the beginning of the present century. It is quite evident that the disease has been present in European countries for a long time, but it was not recognized or even suspected. As late as 1868 Villemin, perhaps the highest authority of the time on tuberculosis, wrote: "Nothing is more problematic than the existence of tuberculosis in birds."

The caseo-necrotic lesions in fowls which are now known to be tuberculosis were variously ascribed to parasitic afflictions and to molds which had entered the air sacs, and were called lympho-sarcoma, tuberculo-diphtheria, or that vague and non-committal term "scleroma."

Tuberculosis in chickens was reported for the first time in

¹ Presented before the twenty-fifth annual meeting of the Minnesota State Veterinary Medical Association.

our country in 1896 by Bray of Kansas. As no tubercle bacilli were found and the diagnosis was based on the general appearance of the lesions, we generally look to Pernot of Oregon for the first authentic description of the disease on our continent. In 1900 he reported several outbreaks in which the organisms were demonstrated and the gross lesions fully described. The disease was known to exist in European countries before the discovery of the Koch bacillus, both in poultry and in the aviaries of the large zoological gardens. The London Gardens alone showed a 30 per cent infection of 500 dead birds examined over a five-year period, and Koch and Rabinowitsch reported from the Berlin Garden 459 dead birds from 1903 to 1905, of which 27 per cent were affected with tuberculosis.

DISTRIBUTION AND ECONOMIC IMPORTANCE

Evidently the disease today is extremely widespread, as it is reported from all countries where the poultry industry forms a part of agriculture. Apparently it has spread alarmingly and extensively in certain sections of the United States during the last few years.

Our own State of North Dakota illustrates this point fairly well. The records show that the first tuberculosis in fowls in the State was reported in 1907, and as late as 1911 and 1912 our laboratories at the Agricultural College received less than one tuberculous specimen per month. The condition has steadily increased until during the last two years more than 100 fowls which were found to be tuberculous have been presented annually for diagnosis. Even these figures do not represent the actual conditions, as meanwhile hundreds of poultry owners have been directly informed and thousands more have been made more or less familiar with the disease through bulletins, circulars and other educational agencies.

Indications are that many other States are experiencing similar increased infections; for example, California, Washington and Oregon of the Pacific Coast, and Montana, Wisconsin, Minnesota and New York of the northern border and several of the Corn Belt States.

The economic importance of the disease in such highly infected States is becoming considerable. We should not only judge from the actual number of fowls which annually die from the disease, but should take into consideration the tremendous

loss of poultry flesh as the result of the wasting nature of the disease. In the large henneries of some States it has been known to decimate from one-fifth to one-third of the flock. Consequently the losses at present mount into the millions annually.

During the past winter and spring one of our practicing veterinarians applied the intradermic test to more than thirty flocks in his territory, and this revealed tuberculous fowls in about 90 per cent of the flocks, in which the degree of flock infection ranged from about $2\frac{1}{2}$ to 65 per cent. This being true in one vicinity, you may well ask yourselves what is the situation in your own community. The condition is well worth investigating.

CAUSES—THE AVIAN TUBERCLE BACILLUS

It is generally accepted that the avian strain of the tubercle organisms causes an overwhelming majority of cases of fowl tuberculosis. Although some authorities state that from 6 to 10 per cent of the infections are due to the mammalian types, most investigators are of the firm opinion that practically all tuberculosis in birds, with the exceptions of parrots and canaries, are the result of the avian strains. The avian type differentiates itself from the human and bovine strains principally by being more easily isolated and more readily cultivated in pure culture on artificial media. As a rule the avian bacilli are shorter than the human and more narrow than those of the bovine strains and stain more uniformly than both mammalian types, but these characteristics can not be relied upon as dependable and substantial bases for differentiation.

The marked differences in the pathogenicity of the two forms are apparently of vastly greater importance. While some workers regard the two forms of bacilli as distinct species, and consequently look upon avian and mammalian tuberculosis as two etiologically distinct diseases, there is weighty evidence at hand pointing toward a close relationship between these two forms of bacilli.

Parrots kept in houses for pets show as high as 50 per cent of infection with the human type of organisms, whereas in aviaries the avian type prevails in most cases. Upon experimental feeding and inoculations this species shows least susceptibility to the avian type, showing a higher preference for the mammalian tubercle germs. Many investigators have repeatedly failed to produce tuberculosis in the common fowl and

the pigeon with the human type of bacilli. Among the mammals which can contract tuberculosis from the avian bacilli are mice, rats and rabbits living in poultry houses. Quite a few spontaneous outbreaks of tuberculosis in mice have been reported as being caused by the avian germs, and it has been proven that field mice in particular are very susceptible to avian tuberculosis.

Of all domesticated farm animals it appears that swine are the most readily infected with the avian organisms. The disease has been produced in swine by both feeding and inoculating methods in which infected avian material was used. Mohler and Washburn experimentally induced it in hogs in 1909 and at that time pointed out the probable dangers of allowing swine to feed upon the carcasses of tuberculous fowls. Further, tuberculosis has been observed many times in swine by the Griffiths of England and Christiansen and others on the Continent in cases in which the avian organisms were the etiologic agents.

While the foregoing data show that hogs can and do contract the avian type of the disease, nearly all investigators state that it is practically all localized and very rarely spreads farther than the neighboring mesenteric lymph glands. The remaining animals appear to possess a relatively high degree of immunity in spite of the fact that two cases of avian tuberculosis have been found in horses and a few calves have been infected experimentally. The guinea-pig shows a remarkably low degree of infectivity to the avian disease. Large intraperitoneal injections will cause death, but presumably from an acute toxemia. Guinea-pigs can not be infected by inhalation, and very rarely by feeding. It is quite generally conceded that the avian bacilli do not present any serious danger to the human race.

Until quite recently the term avian tubercle bacilli has been associated with John's disease of cattle and lupus of man. It is now definitely known that there is no relationship between them whatever. Some investigators have gone so far as to attempt to diagnose John's disease by means of avian tuberculin. The results are very irregular and unreliable.

SUSCEPTIBILITY OF VARIOUS FOWLS AND BIRDS

The common fowl (chicken) is the principal sufferer, but other birds living with it do not escape. Turkeys, guinea fowls, peacocks and hand-reared pheasants are very often found in-

fected. Ducks and geese, though much less susceptible, are occasionally attacked. Pomay found upon a very heavily infected farm that 80 out of 98 turkeys were diseased, but not a single duck or goose, though ducks and geese were mingling with the turkeys. Thus it appears that ducks and geese usually escape under conditions of domestication, but they do not enjoy complete constitutional immunity.

Among the other birds which fall victim to the disease, especially in captivity, are parrots, canaries, pigeons, swan, owl, vulture, goldfinch, partridge, and practically all birds held in zoological gardens and aviaries.

Koch and Rabinowitsch in 1907, after investigating the birds of the Berlin Zoo, said that "in all probability every species of bird is liable to tuberculosis." However, the disease is extremely rare in the wild birds living under natural conditions. Therefore we can perhaps apply Dr. Philips's aphorism on human tuberculosis to the disease in fowls, that "it is a vicious by-product of an incomplete and ill-formed civilization."

DIFFERENTIAL DIAGNOSIS

From symptoms only it is very difficult and in most cases impossible to differentiate the disease from certain other affections, such as lymphadenoma and sarcoma of the liver, asthenia, nodular tæniasis and the air-sac (*Cytodites nudus*) disease, as well as certain nutritional disturbances. Therefore in many instances it requires a most careful examination in order to arrive at a positive diagnosis. Upon postmortem examination properly stained cover-glass preparations from the tubercles invariably reveal the presence of tubercle bacilli, and a positive diagnosis in the dead fowl is usually a comparatively easy task.

FLOCK INFECTION DISSEMINATION WITHIN THE FLOCK

Apparently the spread of tuberculosis within a flock is more extensive and rapid than that encountered in mammals. However, the close contact and large numbers of birds in more or less confinement largely account for this condition. As in other transmissible diseases, the spread of tuberculosis takes its start either directly or indirectly from a diseased bird. Tubercle bacilli can not under ordinary conditions grow outside the body of the animal. Avian tuberculosis is no exception to this rule, and when it is encountered in a flock its presence is due to an introduction of the infection from without. From its alimen-

tary involvement large numbers of bacilli are frequently found in the droppings, therefore the presence of infected fowls in a flock usually means the distribution of great numbers of bacilli through the feces. The long winters and long periods of housing of fowls in our part of the country, together with the absence of proper poultry-house sanitation, apparently account for a large per cent of our flock infections. The overcrowding and feeding off ground and floors which can be grossly contaminated by one or more infected birds is without doubt a prominent contributing factor.

TRANSMISSION FROM FLOCK TO FLOCK

There is but little doubt that the diseased bird is the important agent in the spread of the disease from flock to flock. The sale and exchange of birds is almost sure to result in bringing in the disease. When we consider the numerous possibilities open to infection of show and sale birds placed in the local cages, which are rarely thoroughly disinfected, we do not wonder that such fowls bring back the disease to the home flock.

Again, the pigeon and the English sparrow in their frequent visitations to the poultry yards for feeding purposes, together with their migratory proclivities to neighboring farms, are highly probable means of spreading the tubercle germs, both through their droppings and by mechanical means, such as feet and feathers.

Pernot of Oregon, Mohler and Washburn of the B. A. I., Higgins of Canada, and Koch and coworkers of Germany have shown the presence of tubercle bacilli in some of the eggs of infected birds. Although the number of infected eggs is apparently very small, it may be sufficient to bring infection into a healthy flock, by way of eggs for hatching purposes. Koch and Rabinowitsch infected a number of fertile eggs with avian tubercle bacilli. They were incubated, but only one hatched. The chick died of tuberculosis in 75 days in spite of the fact that it had been kept as free as possible from contaminating influences.

THE NORTH DAKOTA SITUATION

A tremendous amount of infection exists within our State. Many flocks are infected where the birds are not exhibited or shown and where no new stock is brought in and where there is no buying or exchange of eggs for hatching purposes. These

conditions bring out the fact that the carrier problem in this disease is even more unknown and unsolved and more mysterious than that encountered in many other infectious diseases.

Inasmuch as common mice are fairly susceptible to avian tuberculosis, and many spontaneous and natural infections in mice have been caused by the avian bacilli, is it not possible that these animals are much more implicated in the spread of the disease than we have accused them in the past? Mice not only migrate from farm to farm of their own free will in quest of food or possibly for other reasons, but a large number of mice are actually transported in hay bales, grain bags and feeds and forages in general which are carried from one farm to another.

Another possible carrier and one which is almost wholly overlooked is man in his various activities. At the majority of farmsteads the poultry is allowed to run at large, but mostly confine themselves to the runways immediately adjacent to the farm buildings. Under such conditions diseased birds deposit their infected feces anywhere and everywhere. The various members of the family can and do step upon these droppings and can readily carry them to their neighbors. Again, the farm vehicles, and especially those which the fowls use for roosting purposes, can serve as most potent carriers to the neighboring farmyards.

CHARACTERISTICS OF THE DISEASE

Poultrymen and persons not familiar with the disease refer to it variously, such as "lighters," "going light" and "spotted livers." These are all fairly good terms, as almost every case of tuberculosis in fowls is represented by one or more of these characteristics.

Avian tuberculosis is to be classed as a disease of the abdominal cavity and organs rather than of the pleural cavity. The constant occurrence of the tuberculous lesions of the liver, spleen, intestines and peritoneum of fowls indicates in a rather definite way that the infection is of alimentary origin.

Birds showing visible symptoms of the disease are invariably old birds, i. e., they have passed through at least one or more winters. It is extremely rare that we find the disease during the summer and fall in chicks hatched in the spring of that

same year. However, on experimental feeding it has been shown that young chicks are easily infected.

PHYSICAL SYMPTOMS

Under natural conditions it requires a rather long period, usually months, for the disease to become apparent. The physical symptoms and external manifestations are often slow in cropping out. However, the fowls usually begin by showing droopiness and drowsiness in disposition. They progressively emaciate and "go light," and often the birds show less than one-third of their normal weight in time. Anemic conditions usually prevail and are evidenced by a paleness about the head, comb, wattles and visible mucous membranes. A number of the fowls show a tendency toward lameness, and not infrequently confuse tuberculosis of the feet with the common condition known as "bumble foot." The latter condition is a necrotic involvement of the pad of the foot which may extend up the leg some distance. The tuberculous lesions are confined more closely to the lower joints and rarely rupture through the skin. One condition is sometimes found complicating the other in the same foot.

The birds soon become weak and in the course of the disease they are unable to mount the roosting perch. This weakness causes them to sit about on the ground the major portion of the time, and when roused they walk away languidly only to settle back on the ground again from exhaustion. Occasionally a bird is found dead on the nest or drops dead from the roost. In the last stages the feathers become dull and ruffled. The appetite usually remains very good and they often eat ravenously until a few days before death.

AUTOPSY FINDINGS

In the lesions of fowl tuberculosis caseation is the prevailing and predominant condition. The softening and liquefying stage so commonly met with in man and some other mammals is extremely rare, and calcification very seldom occurs. In hundreds of tuberculous fowls presented at our laboratories the writer recalls only a few instances in which calcification was present. This was found in the liver, in which the lesions approximated grains of sand in size and in which the calcification was apparently complete.

While the lesions are widely distributed, they do not as a rule vary as greatly as those found in infected mammals. They range in size from a pin point to that of a pea, hazelnut and even a small black walnut. Although the lesions appear small in comparison with those found in animals, they are relatively larger when we take into consideration the comparative sizes of birds and animals. In turkeys in particular the lesions show a great tendency to become confluent in the liver, where they often take on enormous dimensions, becoming as large as a pigeon egg or larger, and the liver may become three times its normal size. Again in many instances in common fowls the liver shows but little increase in size and the tubercles remain miliary with little or no inclination to become confluent.

Of all organs the liver shows the highest percentage of infection, with the spleen, intestines, mesentery and lungs being affected in the order named. A few foreign investigators report an exceedingly large number of lung lesions, but our own findings place them about parallel with those found in the kidneys. In the spleen the lesions simulate those of the liver in nature and consistency and are almost as frequently met with as in that organ.

The alimentary tract may be affected anywhere from the mouth to the cloaca, including the crop, esophagus and gizzard, but the lesions are most common in the intestines. Here the tubercles become multiple, building one upon another somewhat resembling the characteristic pearl disease common to ruminants.

Two theories prevail as to the development of the intestinal lesions:

1. That they have their origin in the villi of the mucous membrane, whence they extend outward through the intestinal wall, leaving only a scar in the mucosa, or a communicating fistula with the lumen of the intestine.

2. That the bacilli pass through the intact mucous membrane and set up primary lesions in the lymphoid tissues in the intestinal wall. In the development of the tubercles they may extend outward, where they become multiple, forming a conglomerate mass of nodules just under the serosa which often takes on large dimensions. At the same time the tuberculous process may make its way inward where it opens into the intestinal lumen.

These intestinal lesions, which can readily cast their contents directly into the ingesta and feces, together with the bacilli which are excreted by diseased livers via the bile, constitute the principal sources of fecal contamination as frequently evidenced in the droppings.

In the kidneys the nodules are miliary in nature, almost ivory white in color, and rarely become confluent. We have in a few instances demonstrated the bacilli in the excess of uric acid in the congested renal tubes when the tubercles were entirely absent.

The skin lesions as ordinarily observed are confined mainly to the featherless parts of the body, such as the eyelids, nasal openings, root of the beak, and the skin of the feet and legs. In the latter places they often occur as warty outgrowths of the skin, but not infrequently they complicate the joints, setting up a deforming arthritis which accounts for the so-called "rheumatic condition" and lameness which is encountered as a clinical manifestation of the disease. More detailed examination in advanced cases occasionally reveals lesions at the roots of the feathers. It is quite possible that lesions in the carcass skin are much more common than supposed, as most observations are made upon the internal organs and those portions of the exterior which are free from feathers.

In deep contrast to cattle and hogs, the lymph nodes are relatively free from lesions; however, there is an anatomical reason for this, as the lymph nodes or glands are but slightly developed in fowls.

Not all tuberculous fowls show macroscopic lesions. There are some birds which bear all the symptoms and external signs of the disease which when examined postmortem fail to present visible lesions. We encountered this condition quite often in our own laboratories some years ago when working with the intradermic test. Some birds showed typical positive reactions, but when opened were lesionless. Microscopic smears made from the pulp of the liver and spleen revealed the presence of acid-fast organisms which we interpreted to be tubercle bacilli. A few of these cases showed the tissues fairly swarming with the organisms, while in the majority of them the number of bacilli was moderate and limited.

Such conditions of tuberculosis are said to be caused by what is known as the "Yersin type" of bacilli. They multiply more

or less in the tissues but show no inclination to colonize and produce tubercles. The ordinary bacilli which produce lesions are known as the "Villemin type," which is the type most often met with in both animals and fowls. It is necessary that we mention this lesionless factor, as it helps to explain some of the apparent failures of the intradermic test, and therefore should be reckoned with in connection therewith.

Since this lesionless condition has been encountered in typically positive reacting fowls and the diagnosis has apparently been confirmed by demonstrating acid-fast organisms in microscopic smears made from the liver and spleen tissues of such birds, the thought of a similar condition existing in cattle suggests itself. During the last few years the B. A. I. workers have been able to find acid-fast germs in a large number of lymph nodes obtained from positive reacting cattle which presented no visible tubercles on postmortem examination. Is it not possible that the "Yersin type" of the bacilli is responsible for at least a part of these cases? We believe the condition warrants further consideration and investigation.

DETECTION AND DIAGNOSIS

Usually it is not very difficult for one to arrive at a correct diagnosis and render a reliable opinion in regard to this disease. When we gather the history of fowls "going light," becoming anemic and showing paleness about the head, and manifesting weakness by sitting around on the ground, we can almost be sure that such fowls are affected with tuberculosis. However, in some cases where the symptoms are less patent, it is advisable to slaughter a sick bird and make postmortem examination where the presence or absence of the "spotted livers" and other characteristic lesions will either confirm or deny the presence of the disease.

THE INTRADERMIC TEST

Lastly, we have access to the intradermic test, which, if applied correctly, can be relied upon as a very dependable diagnostic measure. For this purpose it appears as though tuberculin made from the avian strain is slightly more efficient than the mammalian product. While many have used ordinary mammalian tuberculin on fowls with gratifying results, the fact remains that those who have made comparative tests with both tuberculins report a larger percentage of reactors with the

avian product. It is quite reasonable to presume that tuberculin made from the specific type of bacilli would in the end be more satisfactory. However, it might be well to suspend judgment upon this phase of the question awaiting further data.

The tuberculin is best administered by means of a 26 or 27 gauge needle, the same type that is commonly used for intradermic work in cattle and swine, except slightly smaller in caliber.

Either wattles or comb can be selected for the seat of injection, but the wattle offers the best opportunities for the most satisfactory results. Frequently, and especially in the winter season, the epidermal layer of the comb is crumbly, friable and brittle, which renders it very undesirable. The flat side surface or the free ventral border of the wattle seems to be equally suitable. The operator grasps the wattle with the thumb and forefinger of the left hand, and with the syringe held firmly in the right hand, the needle is carefully inserted into the wattle as superficially as possible. An attempt should be made to lay the tuberculin (2 or 3 minims) just beneath the epidermal layer or as near it as possible. The raising of a white blister, about half pea size, at the point of the needle, the result of pressure necrosis, is an indication of an ideal injection.

A positive reaction is manifested by the presence of an appreciable local swelling at the point of inoculation, much like that observed in cattle, in which there appears to be a considerable degree of variation in the intensity of the reactions. They range from split-pea size swellings at the point of inoculations to thick, diffuse, edematous enlargements which sometimes take in the entire wattle and occasionally extend to the opposite wattle. The reaction swelling may begin to appear in from 12 to 15 hours or even earlier, and many reach their full development at 24 to 36 hours. However, when only one reading is made, 48 hours after the injection is perhaps the best time. While a few reactions may show best at 72 hours, a large majority of them begin receding after 48 hours.

PREVENTION AND ERADICATION MEASURES

Acknowledging the fact, which also prevails in many other infectious diseases, that all is not known pertaining to all the possible means of dissemination and the carrier problem in

fowl tuberculosis, we are not in a position to lay down absolute and air-tight measures for its prevention and control. However, reasoning from the basic knowledge which appears well established relating to this disease, we believe the following specific regulations and general sanitary precautions, if diligently applied and conscientiously adhered to, will keep this increasing disease well within reasonable economic bounds:

1. Provide proper hygienic conditions in the poultry house, a roomy house with plenty of south frontage windows and adequate ventilation. The layman is too prone to believe that cold air means fresh air, which is not necessarily true. Make provision for separate apartments for roosting and feeding activities. Both apartments should be cleaned of litter at least once a week, so as not to compel the birds to wallow and feed in their accumulated filth which may be contaminated by the infected droppings of one or more diseased birds. The long-continued confinement of a large number of our northern flocks in cramped quarters, illy ventilated, with practically no sunlight and in many instances under the complete absence of sanitation, are surely ideal predisposing factors for tuberculosis as well as many other poultry diseases.

2. Keep close watch on the flock for dumpy, weak, pale, lame and large-jointed birds. As soon as they appear destroy them or isolate them from the flock.

3. If postmortem examination of the destroyed bird reveals the disease, this is an indication for the tuberculin test to be made upon the entire flock to determine the degree of flock infection.

4. In case of heavy flock infection of scrubs and grades, advise the slaughter of the entire flock of the old birds at the close of the spring laying season, and keep only young fowls the coming year.

5. If the degree of infection is small and negligible, destroy immediately all positive and suspicious reactors and thoroughly disinfect the poultry house, pens and immediate runways, advising a retest the following year.

6. Where purebred flocks are maintained in which valuable blood lines are involved, the tuberculin test and a method of control along the Bang system can be instituted and carried out with success and economy.

7. In the purchase of new stock, buy purebreds only sub-

ject to the tuberculin test and from known healthy flocks, in so far as this is possible.

8. Since it is possible to transmit the disease by way of the eggs of tuberculous hens, purchase and exchange eggs from healthy flocks only, if such can be determined beforehand.

9. As the carrier problem is a very uncertain factor at the present time, perhaps we can do no better service than to advise along general lines in accordance with tuberculosis in mammals. I refer to the control of fowl droppings and particularly the avoidance of carrying them to neighboring farms on shoes and farm vehicles and implements, and also the suppression of pigeons and sparrows and the destruction of mice and rats harbored about the poultry houses, which are probable carriers of the disease.

10. All tuberculous fowls, as well as the offal from birds used for the table, especially if obtained from outside sources, should be destroyed, preferably by complete burning.

11. Further, it is highly advisable to cull out all old fowls not desired for breeding stock before winter sets in. This plan not only eliminates possible diseased birds which otherwise would be harbored with the well fowls during our long winters, but, owing to the fact that old hens are less profitable from the production viewpoint, such a policy would be in accordance with good poultry husbandry.

12. Thoroughly disinfect the poultry house, pens and eating and drinking utensils from time to time, and in case of severe infections in fowls kept under close confinement, abandon the old breeding and rearings grounds for a year or more.

CONCLUSIONS

It appears from the available literature on this subject that, with the exception of the intertransmissibility of avian tuberculosis between fowls and swine, the disease in fowls stands out almost alone with its problems of hygiene and economy.

We will grant that such a conclusion is quite tenable, as based on our present knowledge of conditions. However, inasmuch as the researches on this phase of the tuberculosis problem have been relatively few in number and some of them more or less limited in scope and extent, one may raise the point of the need of further and more comprehensive and detailed investigations upon the further intertransmissibility of tuberculosis between fowls and mammals.

FORAGE POISONING ¹

By CHARLES W. FISHER

Danville, Kentucky

FORAGE POISONING is a term applied to a number of animal diseases which are supposed to be caused from poisonous feed. Of late, however, we connect the term forage poisoning with botulism. In our opinion botulism should be identified as such and leave the term forage poisoning to apply to the other diseases such as cases due to fungi or acrid substances in the feed, either dry or pasturage. Possibly cornstalk disease and cottonseed meal poisoning should come under this head until we have learned more about them. Poisoning due to specific and well-known poisonous plants, such as hemlock, loco, larkspur, lupines, etc., should be classed not as forage poisoning but as hemlock poisoning, larkspur poisoning, etc.

The title given me for my paper was forage poisoning, but one paper could not begin to touch on this large field, so I will confine the remainder of the paper to botulism.

Botulism is a disease affecting all animals. Horses, mules and asses are more susceptible, with the dog slightly susceptible. The writer has seen two cases of botulism in dogs. Cattle, sheep, goats and swine seem to have about the same resistance. Pregnant animals are more susceptible than nonpregnant. Chickens are slightly susceptible. It seems that chickens and dogs receive the infection from maggots or decomposed animal matter, and this only in the hot months of summer, while nearly all botulism affecting other animals will be found during winter and spring. The winter and spring following a drought seem to increase the number of cases of forage poisoning, while we may find a sporadic outbreak at any time. We may also find only one animal out of a large herd or stable to be affected while on the same feed as the others and the others remaining healthy. This is accounted for by the peculiarities of *Bacillus botulinus*, inasmuch as it is an anaerobe. Should one small spot of a silo be contaminated and the air excluded from this particular spot, the toxins would be present in this one patch.

¹ Presented at the meeting of the Kentucky Veterinary Medical Association, February 7-8, 1922.

The animal receiving this one particular forkful would develop the disease and possibly die, while all others remained healthy.

ETIOLOGY AND BACTERIOLOGY

Botulism is due to a specific anaerobic organism known as *Bacillus botulinus* and described as being a large, straight rod with rounded ends, 0.8 to 1 micron wide and $2\frac{1}{2}$ to 6 microns long, slightly motile. Spores form in alkaline glucose pork broth at room temperature. The spores are oval in shape, distending the wall of the organism, and situated near the end of the bacillus. The organism is Gram-positive and stains readily with the ordinary anilin dyes. The bacilli are single but may occur in short chains.

MODE OF INFECTION

As the term "forage poisoning" implies, the infection comes from contaminated feeds. The appearance of the feed seems to have very little to do with forming an opinion of just which feed contains the poison. It has been found that bright, wholesome-looking feed is just as apt to contain the poison as is moldy or damaged feed. When a ration of corn, hay and silage is fed and an outbreak occurs, it will be necessary to conduct a feeding test to ascertain just which feed to condemn.

MORBID ANATOMY

The morbid anatomy is variable, according to the severity of the attack, but may involve changes in the mucous and serous membranes, the meninges, lungs, heart and kidneys. In animals which die within a few hours after symptoms manifest themselves scarcely any changes are noticed. As a rule, however, the gross lesions noticeable will be: Meninges slightly injected; slight congestion of the lungs; hemorrhagic spots on the heart wall; local areas of ramification on the inner walls of large colon, with scattered punctate hemorrhages; liver engorged with blood; kidneys hyperdermic and capsule injected.

SYMPTOMS

The symptoms are loss of appetite, muscular tremors, salivation, nervous attitude, respiration accelerated, paralysis of the tongue and pharynx, slight watery discharge from nostrils,

awkward prehension of feed, yawning, chewing, obstinate constipation, incoordination, stupor and decumbency. The temperature is normal or slightly subnormal. The animal after becoming decumbent will work the legs as if running for a time and then lie quiet for a time, often cutting the legs. However, animals seem to notice things about them until the very last stages of the disease.

The period of incubation seems to be from one to ten days. Animals die in from twenty-hour hours to four or five days. Some even die without showing any noticeable symptoms. These cases, however, are rare, the most cases showing symptoms for twenty-hour hours to two or three days before death.

DIFFERENTIAL DIAGNOSIS

Botulism may be mistaken for an inflammation of the brain, but the temperature in the latter would tend to differentiate between the two diseases, together with the salivation and paralysis of the tongue and pharynx. Other forms of poisoning might be confused with botulism, but it is not at all difficult to make a diagnosis of botulism after the symptoms have been studied, together with the history, which generally puts one on the right track.

PROPHYLAXIS

The injection of 40 to 100 c.c. of polyvalent botulinus antitoxin intravenously for horses and mules will protect them for a short time, possibly ten to thirty days. However, if the injection is given and the animals kept on feed contaminated with *Bacillus botulinus* they build up a permanent immunity. This, however, can not be wholly depended upon, inasmuch as there is no known way of regulating or ascertaining the amount of the toxin given. By repeated injections of the antitoxin it is possible to feed out the remaining contents of a silo or loft with safety.

TREATMENT

The treatment consists of intravenous injections of 40 to 100 c.c. of polyvalent botulinus antitoxin. Large doses have been recommended, but our experience has taught us to prefer the smaller dose of 40 c.c. repeated at 12 to 24-hour intervals. Catheterize at each visit for injections. Potassium permanganate

in solution should be given if the patient can swallow and is not too nervous. Anything that irritates or annoys the patients only tends to shorten their stay here on earth, and one should bear this fact in mind just as much as when treating a case of tetanus.

Cases taken in time, before the pharynx becomes paralyzed, should be given a cathartic. The stomach tube comes in handy in animals which are not irritable, and large quantities of salts may be given.

No fixed line of medication can be followed, as one must treat the symptoms present and as they present themselves. Enemas should be used if possible. Hypodermic evacuants are not practicable, inasmuch as they increase the saliva, and the animal, not being able to swallow, will often drown in his own secretions.

The most satisfactory treatment in our hands have been, first, antitoxin in 40 c.c. doses, repeated in 12 to 24 hours; second, potassium permanganate, the old remedy before antitoxin was used. This along with a cathartic and enemas. With this treatment we feel, even though the animal dies, we have done all that was in our power.

MEXICAN QUAIL ARRIVE IN LARGE NUMBERS

Between January 28 and April 20, the closing date for the season of entry of Mexican quail, 37,953 quail were entered at the ports in Texas. This is the largest number since shipments began in 1910. Of these, 9,773 were entered at Brownsville; 15,408 at Laredo; and 12,772 at Eagle Pass. Most of these birds were shipped to Kentucky, Maryland, and Pennsylvania, and distributed through the game commissions for propagating purposes.

Quail disease appeared at Laredo about February 23, and 500 birds were placed in quarantine, but with this exception few losses occurred from the disease. On the whole, the season has been one of the most successful in recent years.

Among the officials of the newly created bureau, known as the Packers and Stockyards Administration of the U. S. Department of Agriculture are the following well-known veterinarians: O. E. Dyson, T. A. Geddes, S. O. Fladness, Frank W. Miller and M. Guillaume.

ANEMIA (CHLOROSIS) IN THE DOG

By OSCAR SCHRECK

New Haven, Connecticut

ANEMIA signifies poverty of the blood of the animal, characterized by a very marked relative reduction in the hemoglobin of the blood. This condition is met with at times in the small animals, as a consequence of great hemorrhages, insufficient nourishment, or any affection that prevents the nutrient intake from being properly absorbed or assimilated, thus impoverishing the blood by depriving it of its most needed constituents; also from profuse chronic discharges, which drain the blood of many of its important elements, and especially of its albumen. Besides these causes of anemia, we find it many times occasioned by poisons, as from distemper, or by retention of noxious ingredients in the blood; in fact, this is the most important form found in the small animals, there being a lack of the important constituents of the blood (red corpuscles), therefore the density of the blood is diminished.

In severe anemia and chlorosis (hydremia) the blood is watery; in marked leukemia it looks a peculiar whitish-red as if mixed with milk, or chocolate color. Upon coagulation it exhibits a great excess of serum; the clot being very small, of a light reddish or rosy tinge, instead of the deep redness of health, and floating in an abundance of nearly or quite colorless liquid. It is, however, usually rather firm, and not infrequently exhibits a buffy and cupped surface. The proportion of red corpuscles is obviously much diminished, and the same is probably the case, to a certain extent, with the fibrin. It must be admitted, however, that there is usually a great deficiency of red corpuscles, not only in relation to the watery portion of the blood, but also to its remaining solid constituents.

Even in the anemia from hemorrhage this relative deficiency is observable, for, though all the constituents are lost in the same proportion, yet the organs concerned in the production of blood find in the animal system much larger supplies of the albuminous and fibrinous principles than of those which constitute the red corpuscles, and, besides, as these probably are a higher result of vital organization, they must be the last to be

generated. The cause of the buffy coat of the clot in anemia is the relative excess of the fibrin over the red corpuscles. It is altogether independent of inflammation.

Puppies and kittens are often affected with this trouble, as the occurrence of the disease is seen frequently in the young, highly bred animals or those of fancy breeds.

ETIOLOGY

Many causes have been assigned for anemia. The tendency to it is influenced by age and peculiarities of the individual. Animals in the extremes of animal life—as puppyhood and the aged—are more liable to anemia than those in the period of maturity. In puppyhood the needs of the growing organism are such as to require the utmost amount of pabulum from the blood; the interchanges are more rapid, the consumption of material greater, and hence the more ready development of anemia, if other circumstances coincide.

In aged animals, on the other hand, the productivity of the animal is diminished, hence the waste may easily exceed the demand if there be any disturbance either in the preparation of materials for the blood or in the retrograde metamorphosis of the tissues.

There are also cases in which it is believed that there is a predisposition to this complaint, a peculiar type of animal construction (abnormally small heart). Such animals are in a condition the opposite of plethora, and are deficient in the amount and quality of blood.

A most powerful exciting cause is an insufficient supply of proper food for the animal, or the food may be otherwise unwholesome. Again, the food being abundant, anemia may be the result of poor digestion and faulty and imperfect assimilation. Also the absence of light, air and exercise. Such causes have been observed in kennels, where two or three animals were affected at the same time. The same may be said of exposure to cold and dampness in the smaller toy breeds and kittens. Prolonged overexertion and debilitating agencies in general impair the vital processes and induce anemia.

Frequent repetition of the sexual act will often be met with in breeding kennels, and also prolonged lactation. This explains, with other causes, the frequency of anemia in the bitch. Also hemorrhages are very powerful causes of the disease.

Anything that will decrease or interfere with the production of the red corpuscles, such as indigestion or imperfect nutrition, from whatever cause, such as derangements of the liver, kidneys, spleen, etc., will cause the disease. The excessive action of the heart, so common in anemia, may lead to derangement of the liver, and is quite common in the aged animal; also the feebleness of the parietes from defective nutrition may lead to anemia. Extensive discharges from wounds, persistent diarrhea, or the sequelæ of distemper, are all causes.

Under all these circumstances, we have to deal with a watery blood, deficient in red corpuscles; in other words, with an anemic condition. Two cases coming under my observation were due to the constitutional action of lead, such as lead and opium wash, used in the treatment of eczema.

SYMPTOMS

The onset in most cases is of an insidious nature, unless due to hemorrhage or exhausting diarrhea, etc. The main symptoms of this condition are an abnormal paleness of the skin (inner side of the thighs, testicles and abdomen) and a pale, bloodless condition of the visible mucuous surfaces, such as the gums, inner side of the lips, conjunctiva, etc. This paleness is undoubtedly present in the vast majority of cases, and still this can not be a criterion, for it sometimes happens that the skin and mucous membrane are anemic or pale, and yet no anemia is found when the blood is examined; then again the skin and visible mucous membranes have a normal color, and yet anemia may be actually present. The legs will be found cold, from faulty circulation, or blood poor in needed elements, and at times are swollen more or less; eyes sunken, with a glistening cast of the sclerotic.

The secretions are sometimes diminished, and associated with this condition are extraordinary dryness of the skin, brittleness of the toenails so that they break close to the flesh, and harshness of the hair, with intense thirst. The hair is often seen to desquamate in patches. Also in some cases there is a slate-colored appearance of the Schneiderian membrane. The bile is also frequently scanty, and there is costiveness, with unhealthy alvine evacuations.

The organs of special sense are peculiarly affected. Vomiting, great muscular debility, and not infrequently irregular muscular contraction, amounting even to convulsions; restlessness, jactation of the head, loss of appetite—still in some cases there will be a morbid, craving appetite—are among the occasional symptoms in acute anemia. In some cases there will be a slight rise in temperature, and we also find in some cases a sub-normal temperature. The pulse is soft, compressible, jerky, and easily excited, and is always aggravated by either excitement or bodily exercise, with general lassitude and inability to take much exercise, showing a want of energy in the heart's impulse. Violent exertion often throws the heart into the most tumultuous action. The respiration, though quiet when the animal is at rest, becomes hurried and even painfully agitated under exertion, as in running, ascending stairs, etc.

The rapidity with which the heart's contractions succeed one another is sometimes extraordinary, and not infrequently their rhythm becomes markedly irregular. There is good reason to believe that hypertrophy and dilatation of the heart may be induced. Occasionally vomiting will be observed, with more or less irritability and excitability of the animal.

DIAGNOSIS

Acute anemia from either internal or external hemorrhage is not likely to be confounded with any other condition. The diagnosis of chronic anemia is readily made from the history and general appearance of the animal.

PROGNOSIS

The prognosis in anemia is determined by the conditions under which it occurs. The earlier its cause is discovered, and the more readily removed, the better the prognosis. Its duration varies; some animals are anemic during their entire lives. When it is associated with or dependent upon organic disease, the prognosis is unfavorable. Death in acute cases results from annulling the function of the medulla, or cardiac paralysis. In chronic cases inanition and exhaustion or some complication induce the fatal issue. Death may occur in syncope, convulsions and coma.

In its early stage the disease is usually very manageable, and

when there are no organic complications, and the animal can be withdrawn from the influence of the causes, it may in general be cured, or at least placed in a fair way of recovery, in a period of time varying from two to four weeks. Under opposite circumstances, and especially when improperly treated, the disease may terminate fatally.

TREATMENT

Before this condition can be properly treated it should be determined whether it is a so-called blood disease or a condition caused by a disease of some other part.

Before deciding that a simple anemia is primary, all secondary causes must be eliminated; but there can be a primary anemia that is mild in form, which, if the cause persists, will become a pernicious anemia with the typical blood picture of the disease. In other words, a simple anemia may be caused by a mild type of the condition that is the cause of pernicious anemia—*i. e.*, pernicious anemia may be mild in type, if one is allowed the paradox.

Therefore in the treatment of this disease it is of the utmost importance to remove the causes. While these continue to act, the use of remedies will be only of temporary benefit. Should the digestive system be in disorder, it must be corrected; constipation must be obviated; any hemorrhage or other drain which may exist must be arrested. Also obviate all possible sources of ill health, and the formation of more blood in the animal. As the conditions to be remedied consist in an impoverished state of the blood also, obviously treatment must therefore be directed to the organs concerned in the elaboration of blood; the organs of digestion, including the liver, and the organs for the production of the corpuscular elements—the spleen and the lymphatic system.

Proper limits of exercise and good air promote the metamorphosis of the tissue, and are therefore very serviceable in anemia; but carried to fatigue, waste is greater than repair.

The preventive treatment of anemia, when it depends upon exhausting discharges, prolonged lactation, and unhygienic conditions, is removal of its causes.

Perhaps the next important of all treatments of anemia is fresh air and sunlight, in the best possible hygienic surroundings. The next most important element in the blood improve-

ment is the diet, and a diet that contains sufficient meat, combined with such vegetable foods as contain iron, and arranged so as to be most easily digested and assimilated by the individual animal. In other words, the diet in many cases must be individualized, embracing a large proportion of nitrogenous elements: fresh animal food (raw meat), eggs, milk, etc., and raw meat and fish for the cat. If solid food can not be managed by the stomach, beef tea, or juice, and milk can be given instead. The forcing of food in the small animals is by me condemned, for my experience is that what the dog does not eat spontaneously is not digested, and thereby causes digestive disorders and destroys any little appetite the animal may have.

The next consideration in the treatment of secondary anemia is that of drugs, and whether or not drugs can stimulate the organs concerned in the production of healthy blood corpuscles. The principal origin of the red blood corpuscles in the matured animal is the red marrow. Sometimes most successful stimulation of the red blood-forming organs is caused by the administration of preparation of red bone marrow (see below). It is of frequent occurrence in any kind of anemia to find the red blood corpuscles increased in number under the administration of red bone marrow. Also medicinally, the administration of iron in some of its forms is highly recommended. This metal, indeed, appears to be almost a specific remedy in this disease. Different writers recommend different preparations, but they are probably all (if given in equivalent doses) equally efficacious. They are best administered in combination with some vegetable bitter or stomachic, such as quinine, cinchona, etc., and in association with occasional mild purgatives, such as mild doses of aloes and myrrh pills, to obviate the obstinate constipation which is so often present, due to a want of tone in the mucular coat.

Syrupi ferri iodidi.....	dr. ii	4.00
Olei morrhua	oz. viii	2.40
Acaciæ	oz. ii	62.00
Syrupi	oz. i-ss	50.00
Methylis salicylatis	dr. ss	2.00
Aqua distillatæ q. s.....	oz. xvi	500.00

Misce et fiat amulsum.

Sig.: Two to three teaspoonfuls after feeding T. I. D.

Indications: Anemia, after hemorrhage. Eggs, milk, and hygienic measures.

I have found malt extracts combined with iron and pepsin

efficacious in the treatment of this affection; also Blaud's pills, 3 to 5 grain doses two or three times a day. (These pills should be made fresh as needed.) Also iron and quinine citrate, 3 to 5 grain doses. I know of no more suitable and easy method for the administration of iron preparations to the small animals than Blaud's pills.

As a general tonic, iron may be ranked as perhaps the first on the list. In action on the animal system it produces all the effects that are characteristic of tonics; it improves the condition of the digestive organs (except in an occasional case), imparts tone to the muscular fiber, increases the action of the heart and blood vessels, and quickens the various secretions. Iron acts also directly on the composition of the vital fluid itself. This can be proven by analysis of the blood before and after the administration of iron. Disorders of digestion so common in this disease usually yield to bismuth and aromatic powders. Still whatever preparations are used should be altered or changed for another after a week or ten days' treatment, and returned to again if needed.

A number of incidental effects may be produced by the long-continued use of iron, principally upon the digestive tract of the animal. One observes in some cases in the small animals with normal digestive powers, after the administration of iron or its preparations, a disturbance of digestion and vomiting, especially when given on an empty stomach.

In anemia of lactation there is a very marked deficiency in the quantity of phosphate of lime, and in all forms more or less reduction of the proper amount of this substance. Therefore the syrup of lacto-phosphate is the best form for the administration of this agent for the above, if well and genuinely prepared. Also emulsions of cod-liver oil are valuable adjuvants when they agree with the stomach of the animal. Also very useful for promoting the nutrition of the animal body, cod-liver oil takes first place. The rapidity of the cure in some cases with this oil is very surprising.

Syrupi ferri iodidi.....	f. dr. ii	8.00
Emulsi olei morrhue	f. oz. viii	240.00

Misce.

Sig.: Tablespoonful two hours after feeding.

Indications: Used in anemia and debility following severe illness.

Pilulas sodii cacodylatis.....	aa gr. ss	0.03
Sig.: One pill after feeding.		
Indications: In anemia of the pernicious type.		
Castorei	gr. xxiv	1.60
Ferri valeratis	gr. xxiv	1.60
Quinine valeratis	gr. xxiv	1.60
Zinci valeratis	gr. xxiv	1.60
Extracti cascaræ sagradæ.....	gr. xxiv	1.60
Misce et fiat pilulæ.No. xlviii.		
Sig.: Two to three pills T. I. D. after feeding.		
Indications: Used in anemia after distemper, with nervous symptoms.		

COUNTY TESTS ALL CATTLE IN A WEEK AND A DAY

The plan for the complete eradication of tuberculosis in the cattle herds of the country does not seem beyond the bounds of possibility when it is demonstrated that an entire county may be cleared of all its reactors in a week and a day. Such a demonstration was recently completed in Essex County, New York, where local authorities, assisted by the State and the United States Department of Agriculture, began the testing of the herds on Friday, May 12, and finished the work on Saturday, May 20.

The county was divided into convenient districts, and 25 veterinarians were taken from farm to farm in automobiles by 25 leading farmers who volunteered their services. By this use of rapid transportation and by careful planning of routes it was possible in two days to test 920 herds containing 5,274 cattle. This was an average of more than 18 herds a day for each veterinarian. Because the loss of time was cut to a minimum and supplies were bought in quantity, the work was done for less than half the usual cost when herds are tested individually.

The most remarkable fact about this campaign is that 100 per cent of the farmers in the county were ready and willing to have their cattle tested. The explanation is to be found in the cooperation of the Board of Supervisors and the Farm Bureau of the county and in previous demonstrations, which had shown the good results of cleaning out the disease. The members of the Board of Supervisors were convinced that a complete cleanup would be a benefit to every farmer and to the county as a whole.

The advertising value of a tuberculosis-free county is the principal factor in making such work popular.

THE RELATION OF PUREBRED SIRES TO THE LIVESTOCK INDUSTRY ¹

By THOMAS M. OLSON

Brookings, South Dakota

THE SUBJECT of this paper has been chosen largely for two reasons: First, because the relation of the work of the veterinarian is more closely allied to the breeding of livestock than to any other phase of the livestock industry. Secondly, because the purebred sire is one of the greatest factors in the success or failure of livestock raising.

Unfortunately very little definite information can be given regarding the science of breeding. It is only within comparatively recent times that the scientifically trained minds have grappled with the question with a view of bringing to light some practical application of the principles involved.

Perhaps we are overzealous in expecting more exact information regarding this mysterious process in the formation of new life. This is particularly cogent when we are reminded that it is only about a century and a half ago that Robert Blake-well put into practice for the first time some of the principles which we now know to be conducive to livestock improvement. He made a conscious effort to select only the most desirable animals, or such animals as conformed to his ideal, for his breeding stock. He went one step farther when he sought to fix the desirable characteristics by mating animals possessing such characteristics. This practice intensified and added prepotency to the common character.

We must not forget that our early shepherds as far back as thirty centuries ago followed the practice of selecting what to them were their best individuals for their breeding pens. This commendable practice, we must admit regretfully, is not followed by a number of our smaller breeders and many farmers of this age.

Primitive as these practices may seem, they harbor the nucleus of what our foremost breeders and scientific workers along breeding lines today regard as essentials in the progress of livestock breeding.

¹ Presented at the meeting of the South Dakota Veterinary Medical Association January, 1922.

Our research institutions have perhaps emphasized the nutrition end of the livestock industry more than the breeding. No doubt there are many reasons for this, but not the least important is the fact that it is absolutely essential that feeding be understood if success is to follow. I will digress from my subject long enough to say that even the best bred animals can not do justice to themselves or their progeny unless properly fed and managed. It is unfortunate that even in this advanced age too many farmers and breeders seem to be laboring under the impression that when a long price is paid for an animal of good breeding with an enviable reputation, highly deserved, the owner has done his share, and now it is up to the animal in question to sustain this reputation and demonstrate his breeding qualities. To the experienced breeder this course of procedure is fallacious, and frequently fatal to the one who attempts it, as well as to the reputation of the animal in question. Proper feeding and management can not be neglected if even mediocre results are to be obtained. The lack of proper feeds fed in sufficient amounts is the mill-stone on the livestock industry, particularly dairying.

Second only to feeding is the question of breeding. We have heard so many times the trite expression that "the sire is one-half of the herd." If the history of our progress in breeding is to be the criterion, we must concede the truth of the expression with an added qualification that he is "frequently more."

As we scan the pages of breed history we are impressed with the number of sires which have stamped their individuality so indelibly on their progeny that they have been designated fountain-heads of breed families, or even new breeds. The prepotency of the sire in fixing and transmitting desirable characteristics is verified in innumerable instances with all classes of livestock.

In dairy breeds we have such noted sires as Sophie Tormentor, the fountain-head of a family of Jerseys which have proven their merits in their ability to produce and reproduce with a consistency and persistency that could only be the result of good breeding. Golden Glow's Chief was the sire of Vive la France, conceded by all to be the wonder cow of all breeds, and Silken Lady Glow, two cows which have produced remarkable records and come dangerously near breaking the records for

their breed. These are only two sires of the Jersey breed. Many others equally prepotent might be given.

Hengerveld DeKol, the bull which put Pontiac, Michigan, on the map, so far as livestock breeders are concerned, is just one instance of hundreds of Holstein bulls which have manifested such prepotency in siring high producers that they were outstanding sires. Anxiety 4th in the Hereford breed is another instance of many in that particular breed.

Among our great horses we have such an outstanding sire as Peter the Great. During the season of 1920 there were 21 three-year-olds that made records of 2:10 or better. Eleven of these were sired by Peter the Great. He has sired 59 animals which have records from 2:10 down to 2:01 $\frac{3}{4}$. One of his daughters holds the world pacing record, 1:58 $\frac{1}{4}$ for the fastest pacing mare. Hambletonian 10 is another outstanding sire, which further substantiates the prepotency of the sire over the dam.

It is interesting, if not significant, to reflect on the result of mating a jack with a mare. The offspring is called a mule, which possesses the characteristics of its sire and not its dam. Its ears, tail and hoofs, as well as its general body conformation, are those of the sire. On the contrary, when the stallion is mated with the female ass or jenny, the offspring or hinny possesses the characteristics not of the jenny but of the male, the stallion. Its hoofs, tail and ears are like those of the sire.

The foregoing are only a few of the many cases which might be given to show the prepotency of sires, but my purpose is to call attention only to the important role the sire plays in our livestock industry. In view of the importance of sires, it would seem from a purely business standpoint that greater care should be exercised in their selection. When a good one is found his services should be utilized to full capacity and the progeny given every opportunity to prove their merits.

The data to which I shall call attention later are taken from work on dairy animals; however, the underlying principles involved are equally applicable to other classes of livestock. In ascertaining the value of a dairy sire we have a very accurate and complete unit of measurement, namely, the milk scales and the Babeock test. When other conditions are comparable it is possible to gauge in a most accurate manner the prepotency of a

sire to increase the milk and fat production in his progeny. A second reason for calling attention to these data is that the dairy industry seems to have relatively fewer purebred sires than other classes of livestock.

The 1920 census shows that we have in the United States 752,371 males, of which 187,299 are purebred; thus about 25 per cent of the sires used in mating on dairy cattle are purebred. That must necessarily mean that a large number of scrub or grade bulls are used in the United States. In South Dakota the 1920 census reports 13,515 males, of which 1,353 are purebred, or about 10 per cent. The same census reports 406,075 dairy cows, including heifers one year old or over. That would indicate that in South Dakota we have only one purebred sire to every 300 dairy cows. Is it fair to assume that a large number of the 406,000 dairy cows are being served by scrub or grade bulls?

It seems well-nigh unbelievable that stock raisers should continue using scrub, grade or even "scrub purebred" sires, in view of the convincing and conclusive data which are available to show the merits of good purebred sires when mated with scrub or grade cows. Authorities are agreed that a good purebred sire is the surest, quickest and cheapest method of increasing the production of a dairy herd.

In 1907 the dairy department of the Iowa Experiment Station procured from Arkansas eight animals—seven cows and one bull. These animals were undersized and inferior in every way when judged from the standpoint of dairy cows. They were just plain scrubs. These cows were placed in the college herd and fed a balanced ration and later bred to purebred bulls of the Holstein, Guernsey and Jersey breeds. Such records were kept as were necessary to a comparison of the production of the daughters and their respective dams. A summary of this work is given in Table 1.

An analysis of this table emphasizes the important role which a sire plays in increasing the production in the progeny. It is also of considerable interest to note the high average production of the scrub dams under favorable feeding conditions. When we bear in mind that the average production for all cows in the United States is 3,412 pounds of milk, we are somewhat amazed to learn that these scrub cows, with no particular merit

as dairy cows, should average 3,847 pounds of milk, thus exceeding the average for all cows in the United States. This remarkable showing can only be credited to the feed and management which the cows received after being placed in the college herd.

TABLE 1.—AVERAGE OF TWO GENERATIONS OF GRADE COWS AND THEIR SCRUB ANCESTORS, IN EXPERIMENT AT IOWA EXPERIMENT STATION.

Group	Scrub dams				Daughters				Grand-daughters				Increase in production			
	Number of cows Number of lactations		Milk	Fat	Number of cows Number of lactations		Milk	Fat	Number of cows Number of lactations		Milk	Fat	First generation		Second generation	
													Milk (per cent)	Fat (per cent)	Milk (per cent)	Fat (per cent)
Holstein . . .	3	16	3,673.8	167.36	3	15	6,757.5	275.66	5	9	10,063.2	385.46	84	65	174	130
Guernsey . . .	3	13	4,496.6	199.62	3	10	4,843.8	229.74	5	8	7,744.9	388.23	8	15	72	94
Jersey	2	13	3,394.0	172.52	2	5	5,460.5	298.00	2	2	5,339.2	282.92	61	73	59	64
Average . . .	17	36	3,847.0	182.40	8	30	5,944.7	261.93	12	19	8,311.4	375.81	55	44	116	106

¹ One scrub cow which was mated with a pure bred Holstein bull was later mated to a pure bred Jersey bull.

The data also indicate that there is a vast difference in purebred bulls. Attention is directed to the result obtained by mating the purebred Guernsey bull with scrub cow No. 33, producing cow No. 87. Her average for four lactation periods was 3 per cent less milk and 2 per cent less butterfat than her scrub dam. Again, when cow No. 58 was mated with another purebred Guernsey bull the progeny, heifer No. 175, for three lactation periods produced an average of 107 per cent more milk and 112 per cent more butterfat than her scrub dam.

It is significant to note the average of the 7 scrub dams for 36 lactation periods, as compared with 8 daughters for 30 lactation periods in the first generation, and 12 granddaughters for 19 lactation periods in the second generation. This phenomenal increase in both milk and fat can only be attributed to the prepotency of the bulls used in siring high-producing daughters. All conditions outside of the breeding were identical, hence the one factor—namely, the sire—comes in for full credit for this increase.

Considerable data from different experiment stations might be given to prove further the important role of purebred sires, but because of lack of space they will be omitted. The mere

fact that a sire is purebred is not an absolute guaranty that the offspring will be an improvement over the dam. If that were so, the road to success in livestock breeding would be comparatively simple and easy of attainment. However, we find that purebred sires sometimes have a detrimental effect, rather than a favorable one, in improving the offspring.

Perhaps no available data which are authentic better set forth this fact than the data in Table 2, compiled by Eckles of the Missouri Experiment Station.

TABLE 2.—COMPARISON OF PUREBRED JERSEY SIRES USED IN THE UNIVERSITY OF MISSOURI HERD.

Sires	Dams				Daughters				Increase in production	
	Number of cows	Number of lactations	Average production		Number of cows	Number of lactations	Average production		Milk (per cent)	Fat (per cent)
			Milk	Fat			Milk	Fat		
Missouri Rieter.....	4	23	5380	234	4	26	4381	216	—19	—8
Hug orotus.....	11	62	4969	231	11	50	4576	245	— 8	6
Lorne of Meridale.....	12	66	4559	231	12	67	5969	287	31	30
Missouri Rieter 3d.....	3	14	4775	238	3	15	8005	384	38	61
Minettis Pedro.....	20	66	5321	268	20	66	5376	271	1	1
rown Bessie's Registrar.....	5	8	6029	293	5	8	4295	217	—29	—26

In 1884 the Missouri station procured 4 Jersey cows and a bull, Missouri Rieter. The average production of the four original cows should be compared with the production of their daughters sired by Missouri Rieter. The daughters of Missouri Rieter were mated to the second herd sire, Hugorotus, and so on. The table represents a period of 26 years, in which time purebred sires were used and mated with purebred cows, yet the daughters of the final mating showed a lower average production than the original four cows purchased 26 years previously. Twenty-six years of breeding, and then learn that one has poorer producers than the cows with which one started the herd is certainly discouraging experience, to say the least. Yet it is a safe conjecture that such is the experience of a large number of our farmers and smaller breeders. If careful production records had not been kept on these animals, the merits of the various bulls would not have been known, neither would the demerits of the various daughters as compared with their dams have been ascertained.

These data certainly impress one with the importance of selecting a sire in which the prepotency for transmitting milk production is well fixed. They also put in the foreground the

need of a practice which is too often neglected, and that is the keeping of "production records." One safeguard, which will at least reduce the chance of a bull siring poor producers, is to buy bulls from dams and sires with production records back of them. It is true that one would have to pay more for such animals, but when one views the results of 26 years of futile breeding, as shown in Table 2, the initial price would be secondary, rather than the primary consideration.

The safest practice to follow is to buy bulls which have been tried and proved prepotent. The only serious obstacle to this course of procedure is that such bulls can not, as a rule, be bought. The breeders who know they have such animals in their herds usually can use them during their entire period of service. However, it is a well-known fact that many good-producing sires have been and are being sold for meat, and their prepotency never known or determined until too late. The moral is that farmers and breeders should keep production records on the daughters of a bull, and ascertain before he is slaughtered whether he is a counterfeit or a real producer of high-producing daughters.

Perhaps when our breeding practices have progressed to the stage where characters become so fixed that they are transmitted to their offspring in each case we need not practice such careful culling. When the character of heavy milk production has become as dominant as the white face in the Hereford we can be reasonably sure when we mate two animals of high milk-producing tendencies the offspring will be a high producer. We would be very much chagrined should we mate a purebred Hereford cow with a purebred Hereford bull and get a black-faced calf. It seems only reasonable that other characters could be fixed so that they will be transmitted with equal accuracy.

This goal in livestock breeding can not be reached by the practice which is followed by so many of our breeders at the present time. Some system of breeding which will accomplish the results sought must be inaugurated and be followed until the desirable characters have become fixed to such a degree that they will be transmitted in nearly all cases. The failure to do so should be the exception rather than the rule. We are cognizant of such persistency in transmission of characters in the case of mating polled animals with animals which naturally

have horns. Many other instances could be given to indicate that it is possible to fix characters to such a degree that their failure to breed true would be rare indeed.

Inasmuch as we wish to intensify the characters, it would seem that any system of breeding which would accomplish this end should be used. Authorities on breeding are agreed that line breeding and inbreeding do intensify characters, good as well as bad. It would seem, therefore, that a judicious system of line breeding or inbreeding would accomplish the end sought. It is apparent that good judgment must be exercised in the selection of the animals which are to be mated, otherwise there is serious danger of producing animals of undesirable characters which are highly prepotent in transmitting these characters.

Some of the evils resulting from inbreeding are decrease in vitality or constitutional vigor and lack of fertility. The effect which close breeding seems to have on these characters can perhaps be explained on the basis that this represents a common weakness of domesticated animals. Inbreeding is not wrong *per se*; it is only when animals of a common defect are mated, and this defect is intensified, that we are made conscious of the defect. After all, that is perhaps the surest and quickest way to detect this defect and eliminate such animals from the herd.

EXTENSIVE DRIVES AGAINST JACK RABBITS

A total of 683,800 jack rabbits have been killed as a result of jack-rabbit campaigns this spring in Utah, Oregon, and Washington. The figures are based on very close counts by farmers and other interested persons and are considered conservative. In the Goose Lake Valley, Oreg., while the actual kills of rabbits were not large, the saving of future crops was very important. This is an irrigated district that is coming into heavy production, and the rabbits do a great deal of damage, consuming feed that would otherwise be available for livestock.

In Boxelder County, Utah, extensive operations were carried on in five communities, and practically every community that undertook the work in a systematic way obtained very satisfactory results. More than 250,000 rabbits were killed in this county alone. In checking up the central Washington district a total of 155,500 rabbits were reported in six counties as having been killed between November and February. This is the most successful campaign ever conducted in the State.

FARM SANITATION¹

By GEORGE W. STILES, JR.

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Bureau of Animal Industry, Denver, Colorado*

THE QUESTION of farm sanitation as influencing the welfare and happiness of mankind, particularly the rural population, is, in my opinion, one of the live issues of the present generation. Vital statistics and health surveys indicate the imperative need of improved sanitation on the average American farm. This is especially true with reference to the human element; however, the same general insanitary conditions constitute a factor worthy of more serious consideration than is usually given them as regards the well-being of our domestic animals.

Paramount among the factors to be considered on the average farm is the question of an adequate, pure water supply. Many devices are used to provide the farm house and livestock with sufficient water for their demands. These types may be considered under various headings, as follows:

WATER SUPPLY

Wells vary in depth from a few feet to several hundred feet, according to the location and thickness of the water-bearing strata encountered.

Wells of the shallow type range from 10 to 50 feet in depth, and are often dug near some stream of water, in marshy places, or in low-lying valleys. Because of the shallow source of the supply, water from such places is usually polluted from surface drainage.

Wells from 50 to 500 feet or deeper are conveniently classified as deep wells, some of which may be artesian or flowing. Water from such depths is generally less exposed to surface contamination than that from the more shallow type of wells. The depth of wells alone, however, does not always insure purity of the product, as much depends upon the topography of the country, surface protection, and the geological formation encountered during the process of drilling. Deep wells

¹ Presented before the Colorado Veterinary Medical Association, Denver, Colo., January, 1922.

are usually drilled or bored, while the shallow ones are more often dug or driven.

Wells may be further classified with reference to the manner of their creation. Some are open, walled with stone, brick, tile, or cement, and the water is removed by bucket or endless pump. Others are of this general type, but the surface is carefully protected by cement or other suitable coverings and the water is obtained by pump. Sand points are often used for shallow driven wells in loose, sandy soil, and may be satisfactory from a sanitary viewpoint, provided surface contamination is excluded.

The purity of a well-water supply depends largely upon the depth, surface protection, character of the soil and remoteness from sources of pollution. In locating a farm well the proximity to privy vaults, hog pens, barnyards and other avenues of contamination should be considered. The surface level or drainage is not always a safe criterion for locating a well. Faults, ledges of rock, crevices, dips and impervious strata may be factors diverting surface drainage into a well, thus destroying its value from a sanitary point of view. If possible a careful sanitary survey should be made by an experienced individual before locating a well for the farm water supply.

Other sources of water for use on farms are springs, cisterns, ponds, irrigation ditches, creeks and rivers.

Springs protected from surface contamination are desirable sources of water supply. When covered, and the water piped to the farm, such springs are valuable.

Cistern water is more often used for the family than for the livestock; however, proper precautions should be observed to protect the supply from pollution.

In this western country many farmers depend upon the use of impounded water, or ponds, for their stock. Very often this is the only available supply. Such places should be fenced in such a manner as to prevent animals from wading into the reservoir and rendering it dangerous from deposition of excreta and urine.

In the course of our field investigations attention has been called to the gross, filthy conditions observed on some farms. Stagnant pools, green with scum, harboring dead animals and other decaying organic matter offer a retreat for many bacterial and parasitic diseases. It may be only a coincidence, but many of the serious losses among cattle, horses, swine and sheep which have come to our attention have been on farms

where such animals were allowed to drink water from ponds as above described.

Irrigation ditches in this arid region, while necessary to agriculture, often become potent sources of disease-bearing water, through sewage contamination, from cities, abattoirs and stock-yards. Bacterial pollution from anthrax, typhoid and kindred diseases may be water-borne for long distances, thus transmitting a specific disease from one farm to another.

Creeks and rivers, while valuable sources of water supply, are more or less polluted and perhaps are factors of disease transmission.

The ideal farm water supply is the deep well, properly located and amply protected from surface pollution. However, we have observed water drawn from deep, nonpolluted wells so carelessly handled afterwards that it became unfit for use.

A single instance is now recalled where an endemic disease was prevalent in a herd of fine horses and mules. The sick animals were not segregated but allowed to drink from the same common watering trough with the unaffected horses. Masses of slimy, purulent nasal discharges were noted issuing from the affected animals into the trough during the act of drinking, to be later swallowed by healthy animals, thus constituting a direct channel of infection from sick animals to well ones.

Calves infested with coccidiosis have been noted drinking from stagnant pools of water, which issued from a clear spring a short distance away, when by a little effort the spring could have been utilized to advantage.

Cholera in hogs has been noted breaking out on the bank of a small stream where the animals had free access to the water, and a few days later hogs below these pens on other premises became infected.

The following analyses illustrate the condition of some farm waters in this locality:

Waters examined in the Denver Bacteriological Laboratory

Well water, polluted.....	18
Watering places, tanks and troughs, polluted.....	6
Ponds and other surface waters, polluted.....	5
Well water, not polluted.....	3
Small streams, polluted.....	3
Irrigation ditches, polluted.....	2
Polluted wells treated with hypochlorite	2
Mine water supply for donkeys, polluted.....	1
Spring, not polluted.....	1
Total	41

Conclusions can not safely be drawn from so few samples examined; however, the results above outlined, and the experiences of other workers along these lines, give some idea of the frequency of polluted waters being encountered on the average farm in this section of the country.

So much for the water supply of domestic animals. Such creatures should have sufficient, pure water at all times.

FLIES

Persons whose daily tasks have brought them into intimate contact with life on the farm during the summer time will remember their experience with the pestilential fly. This dangerous pest, born and bred in filth, living and thriving on dead, decaying organic matter during the interim between meals, comes face to face with us during the dinner hour, and full opportunity is given to consider his ways.

Aside from being a direct and positive factor in human sanitation, the common varieties of flies about the farm, particularly in Southern States, may be factors of disease transmission. Anthrax has been transmitted by the bite of certain species of flies from one animal to another, and experimentally hog-cholera virus is said to have been carried by means of flies. Other animal diseases outside the tropics doubtless will be proved in the future to be fly-borne.

Ox-warble infestation, bots in horses, screw-worm infestation and other economic problems are associated with the general fly nuisance. Removal or proper protection of manure piles will largely govern the propagation of the common house and stable flies. Stable manure should be utilized for its fertilizer value, and not allowed to accumulate and become a menace to mankind. Through the avenue of accumulated manure doubtless many disease-producing organisms are harbored, remaining protected from natural agencies of destruction, until entrance is gained into susceptible animals, there to develop disease.

Perhaps many of our domestic animals are carriers of disease, either bacterial or parasitic, and through the natural channels of elimination these germs may be carried and reach the digestive tract of other animals through the avenue of contaminated feed and water.

FEED

It has long been considered necessary to feed horses and other farm animals good, pure, wholesome feed, whether grain,

grain products, hay or other roughness. Moldy corn for horses is ordinarily considered unfit for feeding. Musty hay and fodder are often viewed with suspicion, and oats contaminated with chicken excreta may result in botulinus infection. The idea that swine can eat anything doubtless is an erroneous attitude toward these useful animals. Rotten, decaying potatoes may induce a form of toxemia, and the feeding of dead animal carcasses to hogs is a dangerous practice. Our records indicate an outbreak of anthrax in swine where 17 of 25 head died from eating a portion of a cow dead from this disease.

Garbage feeding is sometimes a source of disease transmission through ingestion of tuberculosis material, and cholera in swine has been communicated by the use of uncooked garbage. Spoiled meat and canned goods when fed unheated to poultry occasionally produce fatal illness with "limberneck" or botulinus infection.

Domestic animals should not only have free access to a pure water supply, but they should likewise be fed with clean, wholesome feed, for by so doing many losses may be prevented.

GENERAL SANITATION

It is a delight to see well-kept, properly located farm buildings, preserved with paint, fences in good repair, weeds reduced to the minimum, farm wagons and machinery housed and protected from the weather; green lawns and fields, shade trees, flowers, gardens, orchards; and lastly, a contented family with a good start of horses, cows, pigs and chickens. Nothing has been said regarding the conveniences and sanitary arrangements of the home, too frequently sadly neglected, the overworked mother left to get along as best she can, while the year's profits are wasting through rusty machinery, wire cuts in horses, chickens eaten by swine, due to the lack of proper fencing, and numerous other incidents too numerous to mention.

When farmers and their families realize that more intensive training and education are necessary, such as is furnished by a four-year course in our State agricultural colleges, to fit them better for their life's work, then they will be brought to a greater realization of the value of sanitation on the farm; and modern toilet facilities will be provided in the home, removing the dangerous privy vault, greater care will be exercised in the location of the farm well, the general insanitary conditions prevailing about the ordinary farm will be overcome, and their attending dangers removed or reduced to a minimum.

CLINICAL AND CASE REPORTS

(Practitioners and others are invited to contribute to this department reports of unusual and interesting cases which may be helpful to others in the profession.)

RHABDOMYOMA OF THE LUNGS OF A SHEEP¹

By L. ENOS DAY

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TUMORS which are composed principally of striated muscle fibers are of rare occurrence, and especially so in organs other than those of the genito-urinary system.

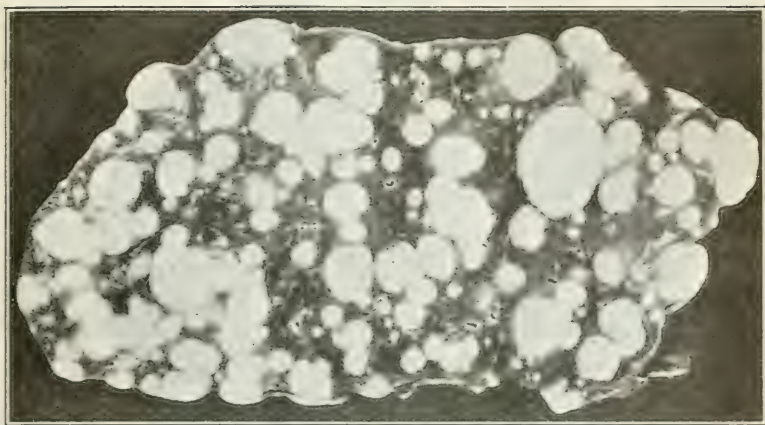
With reference to form, Ewing states that they may appear as single or multiple, nodular or voluminous, flat or rounded, circumscribed or diffuse, and even polypoid growths. This statement is supported by most of the writers. The growths are usually soft and of a gray color on section, mottled with tiny bands of a slightly darker color, which lie in an abundant connective tissue stroma, although cystic forms have been reported.

Rhabdomyomas usually occur in early life, and most of them are probably congenital, yet there have been exceptions. Fuji-nami observed one in a patient 50 years of age and Wolf in a patient 75 years of age.

These neoplasms are generally considered as nonmalignant, yet there have been instances in which metastases were observed. Malignancy in these growths appears to depend wholly on the presence of rapidly growing muscle cells.

The subject of this report, a lamb four or five months old, was slaughtered at one of the large packing establishments in Chicago, Ill., some time ago. The sex and breed were not recorded at the time of slaughter. Upon evisceration both of the lungs were found to contain perhaps a thousand or more spherical nodules, which ranged in size from 1 mm. to 2 cm. in diameter. A cut surface through the greatest diameter of the caudal lobe of the right lung exposed 185 of these growths, which were quite evenly distributed through both lungs. Some of the larger growths were situated just beneath the pleura, but did not appear to involve this membrane. Generally speak-

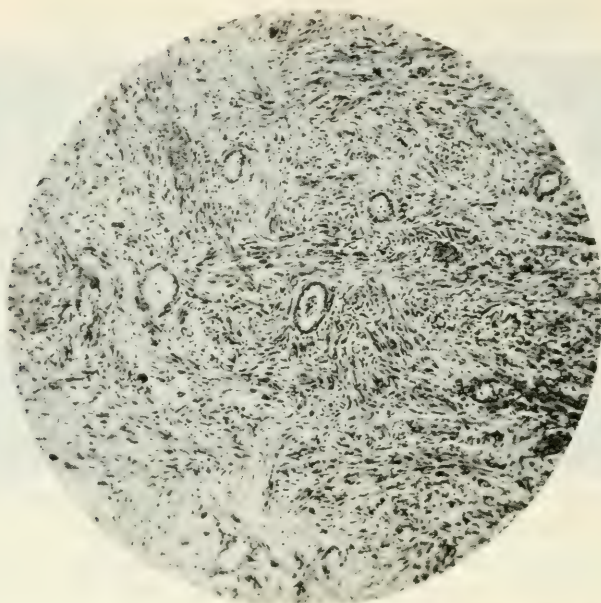
¹ Presented at the Fifty-seventh Annual Meeting of the American Veterinary Medical Association, Columbus, Ohio, August, 1920.



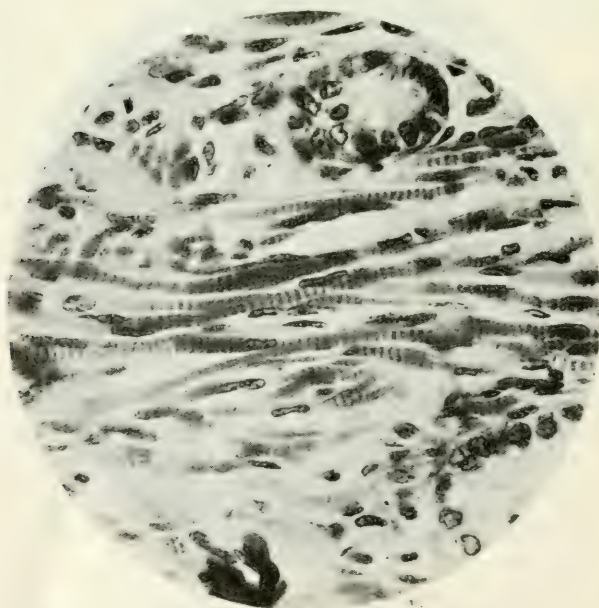
Cut section through caudal lobe of lung



Bronchial tubule. (X 95)



Interlacing of muscle fiber; also circular opening lined with epithelial cells. (X 95)



Striation of young muscle fibers. (X 550)

ing, the peripheries of the neoplasms were comparatively smooth, yet some of the larger ones showed a few bosselations on their surfaces, which appeared to be an outgrowth of tumor substance. In a few places there was a coalescence of two or more tumors. On incising they were fairly firm, but not firm enough to suggest a preponderance of fibrous tissue. The cut surface was pinkish gray, slightly mottled with short bands of a slightly deeper pink.

The lungs appeared normal in size, and the lung tissue which was not involved in the new growths seemed normal in color and texture. All other organs were reported normal by the inspector who conducted the autopsy.

Specimens for microscopical examination were taken from some of the larger as well as some of the smaller growths, as it was desired to secure sections which would be representative of all. The specimens were fixed in Zehner's fixing fluid and later embedded in paraffin. Sections were cut about 5 microns in thickness, stained with Harris's hematoxylin and eosin. A few sections were stained with phosphotungstic acid hematoxylin with very good results.

In viewing the sections under low magnification a large number of long cells, grouped in bundles, extended in all directions. In places the bundles were of even thickness throughout and were woven together in basket fashion. In other places the bundles were fan shaped and were lodged in what appeared to be a stroma of small, round and more or less irregular cells, which constituted not more than 25 per cent of the field. Scattered through each field were from six to eight circular openings lined with large cuboidal cells. At first these were thought to be atrophic bronchioles. In sections from some of the larger growths bronchioles were encountered. In these instances the bronchiole appeared normal, with the exception of a collection of small cells between the epithelial and muscular coat and an edema of the wall and around the periphery of the bronchiole.

When higher magnification was used (about 350 diameters) the long fusiform cells which made up the bundles were found to be young, undeveloped, striated muscle cells, which were arranged in a very orderly manner. Some of the muscle fibers were not striated. In others only a part was striated; that is, one end of the fiber was striated, while the other end was

smooth. Others showed pale striations in the middle and the ends were smooth, and still others had pale striations along one side of their axis and the other side smooth. In many places there were both long and short fibers in the same field, also narrow and broad. The longest measured about 320 microns. The striations were about 2 microns apart. The broadest fiber encountered was 8 microns, while the narrowest was 2 microns. No definitely branched fibers were encountered. Some pear-shaped as well as spherical cells were seen. All of the muscle cells were devoid of sarcolemma. The nuclei were located in or near the center of the cell and never on the surface as in the adult striated muscle fibers. The cell protoplasm was homogenous. No glycogen droplets were seen as mentioned in cases of rhabdomyoma reported by Wolfensberger, Broch and Hibbert. These authors report observing glycogen droplets around the nuclei.

The muscle fibers seemed to be quite evenly distributed throughout the growths. There were very few cells other than muscle cells and cells lining tubules, which will be referred to later, encountered in the sections. Owing to the large number of small round cells present in rhabdomyomas in other locations of the body, some writers have suggested the term rhabdomyoma sarcomatoides. Since only a very few such cells were present in these growths, one could not look upon them as belonging to this class of new growths, but as a rhabdomyoma in the strictest sense of the word. Scattered through the growth were a large number of gland tubules, the lumen of which was from 10 to 180 microns. These tubules were lined with a single row of cells which appear to be epithelial in character and resembled somewhat those lining the tubules of the kidneys, only not quite so well differentiated.

The epithelium of the bronchi and bronchioles was well differentiated. There is an increase of lymphocytes between the mucous membrane and the nonstriated muscle. The muscular coat of the epithelial lining does not appear to take any part in the growths whatever.

Rhabdomyoma in the lower animals is quite rare. The only cases mentioned that I have been able to find are by Kitt in his Text-book of Comparative and General Pathology. He stated that Johne has recorded an adenosarco-rhabdomyoma in the kidney of a hog which weighed 14 kilograms (about 31 pounds).

From the large size of this growth, coupled with my observations of new growths in the kidney of swine, I would be inclined to look upon this growth as an embryonal adenosarcoma, as these growths are of a very mixed character and striated muscle fibers have been observed in them. Of the remaining two, Gratia observed a rhabdomyoma in an old horse in a dissecting room; a fusiform growth about 8 to 10 cm. in length in the vagus nerve trunk about the middle of the neck. The other was found by Kolessnikow growing in the tail and perianal connective tissue of a 20-year-old stallion. This tumor contained pigment cells to which the name rhabdomyosarcoma melanoides was given. Metastases were found in the liver, skin, pleura and peritoneum.

Concerning the histogenesis of the growths in this particular case and the explanation of the presence of the gland tubules, I am of the opinion that they sprang from misplaced embryonal tissue. The gland elements are probably remnants of the Wolfian body, while the striated muscle cells probably sprang from inclusions of the myotome, which were not separated at the proper place in early embryonal life.

A CASE OF DEMODECTIC MANGE IN A BULL ¹

By HOWARD CRAWLEY

Philadelphia, Pennsylvania

ON February 16, 1922, the laboratory of the Bureau of Animal Industry, Pennsylvania Department of Agriculture, received some material which had been expressed from pustules present on the skin of a purebred Guernsey bull. This material, which was of the consistency of soft cheese, contained the parasite of demodectic mange, *Demoder bovis*. The organisms were present in great numbers.

On March 10 the farm on which the bull was located was visited, and the following information obtained: He was born March 23, 1910, and came into possession of the present owner in July, 1920. The skin trouble did not manifest itself until after the close of the year 1921. Observations made at this time revealed a pustular dermatitis extending over both sides, the shoulders, hips and back. The pustules were about the

¹ Contributions from the Bureau of Animal Industry, Pennsylvania Department of Agriculture. New Series No. 9.

size of a small pea, and at the tip of each a minute opening could be distinguished. By exerting considerable pressure a small amount of a white, rather dry pus could be forced from each of these openings. The pustules were rather widely separated, and their effect on the skin and hair was such as to give the animal a somewhat speckled appearance when viewed from a short distance. The condition is illustrated by the figure reproduced from a photograph made at the same time.



Demodectic mange in a bull

Samples of the pus were collected and a microscopical examination made at once revealed the parasites. A bacteriological examination of specimens of pus from several nodules showed *Staphylococcus albus* consistently present.

Several cows of the same herd also showed skin lesions, but these did not resemble those present on the bull. Skin scrapings were made from these cows but the later examination in the laboratory was negative as regards the presence of mange mites of any kind.

Records in the literature of the occurrence of *Demodex* in cattle are by no means abundant. It has been found in cattle in Nyassaland, Africa, and Stiles in a paper published in the

Canadian Entomologist (on *Demoder folliculiorum* var. *bovis* in American Cattle, p. 286) in 1892 showed that the hides of cattle infected by these mites were full of perforations, the result of which was that their value was seriously diminished. It has also been suggested that in cattle as in dogs the dermatitis is due to bacteria which are able to invade the skin.

In dogs the parasite is abundantly present. It does not, however, seem to be readily transmissible from an infected to a clean animal. This has been noted in both dogs and cattle, and the data obtained in the present case are in line. Thus the infected bull was one of a herd of some fifty head, and, although kept but partly isolated from the others, was the only animal known to be harboring this parasite.

Neveu-Lemaire (*Parasitologie des Animaux Domestiques*, 1912, p. 883) gives the dimensions of *Demoder bovis* as about 210 microns long by 50 microns wide. The average dimensions of twenty of our specimens were 216 microns for the length and 56 microns for the breadth. The extremes were 240 and 200 microns for the length, and 65 and 50 microns for the breadth. These figures are somewhat larger than those given by Neveu-Lemaire, more so with regard to the breadth than the length. These measurements were made on specimens mounted in lacto-phenol, and it is possible that there was a slight amount of swelling.

Although this is the first case of demodectic mange in cattle which has come to the attention of the laboratory, the condition is probably commoner than is supposed. Certainly this is a legitimate conclusion from the data given by Stiles. In consequence, it has been considered advisable to report it in detail.

ENTEROHEPATITIS IN A PEAHEN¹

By HOWARD CRAWLEY and E. L. STUBBS

Philadelphia, Pennsylvania

ON January 11, 1922, the laboratory of the Pennsylvania Bureau of Animal Industry received from Wayne, Pa., the carcass of a peahen for examination. The autopsy showed the bird to be in good flesh. The mucous membrane of the mouth was slimy and cyanotic. The lungs and liver were apparently nor-

¹ Contribution from the Bureau of Animal Industry, Pennsylvania Department of Agriculture. New Series No. 10.

mal. The only lesions were found in the ceca. Both of these were affected, but one very much more than the other. In the one more obviously diseased the external surface was marked out in rather faint circular areas, from one-half to three-quarters of an inch in diameter. In addition this entire cecum was greatly enlarged, the wall thickened and the mucous membrane wrinkled and necrotic. The feces both in the ceca and in the intestine were of a greenish black color. From the ceca and rectum twenty-two specimens of *Heterakis vesicularis* were recovered, but the balance of the alimentary canal was free of helminths.

Bacteriological examination of the heart blood, liver and spleen showed no evidence of any infectious or contagious disease.

The macroscopic appearance of the ceca suggested blackhead or enterohepatitis, and sections were made through one of the lesions of which mention has been made. These showed typical examples of "*Amoeba meleagris*." There is a good deal of dispute in the literature as to exactly what this element may be, but it is at all events entirely characteristic in appearance and its presence is proof that the bird in question was suffering from blackhead. Sections of the liver were negative.

On going back over the laboratory records it was found that on September 24, 1913, the carcass of a peacock was received, the cause of death being diagnosed as blackhead.

A REPORT ON THE USE OF MUSTARD IN SEVENTY CASES OF EQUINE INFLUENZA

By V. G. KIMBALL

Philadelphia, Pennsylvania

DURING the past year seventy cases of influenza were received in the Veterinary Hospital. On those showing respiratory and cardiac complications we decided to try out exclusively the use of mustard applications. Those animals with a respiratory frequency of thirty or more per minute and with a marked abdominal type of breathing were selected. Twenty such cases were treated. The temperature, pulse and respiration were noted before and twelve hours after the application. The average temperature, pulse and respiration of the twenty cases before

was 103.9; 63 and 40 respectively; and twelve hours later 102.6; 61 and 28. Although the bare figures denote improvement, the results were even more gratifying. The general appearance of the animals was better, the pulse was stronger, the "flanky" breathing disappeared and the appetite greatly improved. In many cases the respiratory frequency dropped from forty or more per minute to twenty-eight.

Two pounds of Coleman's mustard was used per application. We found that if applied in a very watery condition the effect was better. If the animals had a heavy hair coat we moistened it with water first and then vigorously rubbed the mustard paste through the hair into the skin. (This is more easily accomplished if the paste is thin.) A newspaper was then applied and a stable blanket over this. The effect was noticeable in five minutes or earlier. The dressing was scraped off in twenty or thirty minutes. In only a few cases was severe blistering observed. The writer could see no benefit in producing a large area of vesication as is insisted upon by many. We believe the beneficial effect to be of a reflex character. Furthermore the application can be repeated oftener if necessary and a continued effect obtained, if vesication is not resorted to. We were also prompted to this action by reason of dealers not wanting the horses marked up before sale.

Only cold water should be used in making the paste. The action of mustard depends upon oils which are evolved by the action of the ferment myrosin. The ferment is liberated when the ground seeds are mixed with water. Hot water, alkalies such as vinegar, acids, etc., may neutralize or interfere with the action of the ferment.—*U. of P. Bulletin, Veterinary Extension Quarterly, No. 6, April 1, 1922.*

Dr. C. D. Bailey, formerly in practice at St. Elmo, Ill., has retired from his practice to accept a position with the Liberty Laboratories, as sales representative and laboratory assistant. Several years ago he was on the B. A. I. force in Iowa when hog-cholera control work was inaugurated and was located at Washington, Iowa, where he made many warm friends among the veterinarians of Southeastern Iowa. Dr. Bailey will take up his residence at Ralston, Nebr., and will cover the adjacent territory.

ABSTRACTS

RESUME OF EXPERIMENTS ON FOOT-AND-MOUTH DISEASE. E. Roux, H. Vallée, H. Carré, and the late Nocard. *Compt. Rend. Acad. Sci. Paris*, vol. 173, Dec. 5, 1921, p. 1141. (Abst. in *Bul. Inst. Pasteur*, vol. 20, Jan. 30, 1922, p. 76.)

The facts acquired in the course of an experimental study of foot-and-mouth disease—a study pursued since 1901—are set forth briefly in this note. As a source of virus, the pig, employed at the beginning, gave only a rather small quantity of a virus which soon lost its activity. Infected heifers at the period of rising temperature furnish virulent blood. The blood, defibrinated mechanically, placed in closed ampoules and kept under refrigeration between -1 and -2° C., retains its infective power for several months. Accidental contamination which may occur in the course of the collection of the blood does not exercise any unfavorable action on the preservation of the virus. Dilution, on the other hand, renders the virus extremely weak. The lymph of the vesicles and the ground shreds of desquamated epithelium are particularly rich in virus. They are still infective after dilution 1 to 20,000. Pericardial effusion is infective up to 1 to 1,000, while virulent blood serum ceases to show its pathogenic power with regularity if inoculated in doses of less than 0.2 c.c.

Rapid drying does not destroy the virus; it permits its preservation for a variable time, up to 105 days; but infection is not then manifest except after a period of incubation longer than usual; when it does not occur, the inoculated animal remains sensitive to a regular virulent test. The same result is obtained with virulent blood and lymph weakened by age.

Besides intradermic and intramuscular inoculations, which represent severe modes of introducing the virus, and intravenous inoculation, sometimes formidable in its effects, all the experimental modes of infection are incomparably less severe than the forms of the natural contagion.

Experimental foot-and-mouth disease causes at the outset only buccal localizations, without mammary or digital manifestations. Subcutaneous inoculation is a preferred mode (recommended by

Nosotti in 1885). For that purpose it is preferable to employ a virulent blood serum stabilized by holding for a month under refrigeration. The suitable dose is 1 c.c. In hundreds of animals so treated, mammary or digital localizations have occurred only twice.

Immunity conferred experimentally is perfect as soon as it is established, but is transient. The authors have seen it disappear from hypervaccinated subjects in less than six months.

GOAT TUBERCULOSIS. A. Honeker. *Monat. Tierheilk. Wochens.* 1922, Nos. 5 and 6. (Abst. in *Deut. Schlacht. u. Vieh. Zeit.*, 1922, No. 10, p. 81.)

According to statistics compiled by a goat breeders' association, 6 cases (1 1/3 per cent) of tuberculosis were found among 450 emergency slaughtered goats, and of these one case showed udder tuberculosis. Meat inspection statistics are not conclusive since most of the goats in the country escape meat inspection. According to Hertha the goat ranks third, after cattle and swine. In a herd of 28 animals almost all reacted to tuberculosis; three of the animals were slaughtered and found tuberculous, and it must be assumed that the rest of them were also tuberculous. In Holland the percentage of tuberculous animals was given as 0.153, and in Brunswick in three years it was 0.58. Honeker saw only one case of udder tuberculosis among his eight cases in goats. Hertha likewise observed udder tuberculosis only once in eight cases studied.

In many herds where a large number of goats are affected with a cough and all are apparently tuberculous, the veterinarian is seldom consulted and then only when he shows a special interest in goat diseases.

Honeker describes 11 cases observed by him. Most of them showed lung and liver involvement; there was one case of udder tuberculosis and one in which the testes were affected. The tendency to suppuration and cavern formation in the lungs is especially noteworthy. Tuberculosis of the serous membranes appears to be rare and Honeker did not observe any involvement of the intestines. Instead of calcification there occurs a white or whitish gray chalky deposit, or a sebaceous-like greasy mass in a connective tissue capsule. Mention is made of an infection of a 10-months-old buck from standing for four weeks beside a cow with open lung tuberculosis.

The transmission from goat to goat, according to Honeker's observation, appears to be rare. The author concludes that if science will pay more attention to the diseases of goats it will be sure to receive the support and thanks of the goat breeders.

L. T. GILTNER.

THE VALUE OF TISSUE EXTRACTS OF VIRUS PIGS IN THE PRODUCTION OF ANTI-HOG-CHOLERA SERUM. T. P. Haslam. Jour. Immunol., vol. 6 (1921), No. 4, pp. 263-270 (Abst. in Expt. Sta. Rec., vol. 46, No. 2, p. 183).

The results are reported of experiments conducted at the Kansas Experiment Station to determine whether the expressed or extracted juices from the tissues of virus pigs could be used as a means of hyperimmunizing hogs in preparing anti-hog-cholera serum by the Dorset-Niles method.

The muscle virus was obtained from the ground meat secured under sterile conditions from the hams of virus pigs immediately after killing. Three different methods were used, as follows: (1) The ground meat was frozen and subsequently thawed in such a way that the juices flowed away drop by drop as the thawing progressed; (2) the ground meat was mixed with an equal volume of physiological salt solution and treated as in process 1; and (3) the ground meat was mixed with an equal amount of physiological salt solution, the mixture chilled, and after standing 24 hours pressed through sterile canvas by means of a small screw press. The yield by these methods was about 100, 400, and 400 c. c., respectively, per pound of meat.

After attempting intraperitoneal, intravenous, and subcutaneous inoculation of the virus thus prepared, subcutaneous inoculation was adopted as the safest and most satisfactory method of hyperimmunization. The amount of virus given was 10 c. c. per pound weight of the animal. The potency test of the serum from hogs hyperimmunized with muscle virus consisted in inoculating 40- to 50-pound test pigs simultaneously with 2 c. c. of ordinary defibrinated blood virus and a definite amount of the serum to be tested. Check tests were run with serum prepared from blood virus obtained from the same lot of pigs and with virus alone.

Six complete experiments were carried out, in all of which 15 or 20 c. c. of the muscle virus serum, as well as of the blood

serum, was able to protect 40- or 50-pound test pigs against 2 c. c. of ordinary phenolated defibrinated blood virus, while all of the checks promptly developed hog cholera. In one instance in a further test with heavy shoters the serum made from the muscle virus failed to protect two of the shoters receiving only 35 c. c. of the serum, while those receiving the same amount of blood virus remained well. A possible explanation of the less favorable action of the muscle virus is that it had been stored in a frozen condition for several weeks prior to hyperimmunizing the hogs.

A 200,000-c. c. mixture of serum prepared from muscle virus of a considerable number of animals was tested at three different times. Of a total of 24 pigs receiving from 15 to 25 c. c. of this muscle virus serum and 2 c. c. of ordinary blood virus, all remained well except one which died of pneumonia. Nine pigs received 15 to 25 c. c. of check serum and 2 c. c. of blood virus and remained well, but 2 pigs receiving 10 c. c. of check serum and 2 c. c. of blood virus sickened.

The experiments reported are thought to indicate that serum of considerable potency may be prepared from muscle tissue virus.

ON THE NATURE OF LUMBAR PARALYSIS IN THE GOAT. Osamu Emoto. Jour. of Japanese Soc. of Vet. Med., vol. 1 (1922), No. 1, pp. 1-32.

Among the noble races of goat imported here from Switzerland and their offsprings there has been a disease characterized by paralysis of lumbar region, occurring mostly during summer and autumn, while the common races of goat and other domesticated animals having never been attacked. Its introduction into a farm is caused by the importation of diseased or apparently healthy goats from the locality where the disease is prevailing. The appearance of the disease is always sudden; in a slight case the affected animal is dull and inactive, with the weak hind quarters, but if severer it is lying down, unable to rise up. At autopsy there are no remarkable and characteristic changes in internal organs, but always marked sclerosis of the spinal cord and inflammation of the pia.

A certain streptococcus was isolated from the spinal fluid in all eleven cases which were bacteriologically examined, besides

streptococcus a monococcus and a bacillus were found in a few cases. However the streptococcus could never be found in the spinal fluid of healthy goats and other diseased or healthy animals. Eleven healthy goats inoculated with a culture of the streptococcus showed symptoms and anatomical changes similar to those of the natural cases.

Conclusion.—The lumbar paralysis in the goat is an infectious disease affecting the noble races, characterized anatomically by meningitis spinalis and sclerosis spinalis, its specific cause being a streptococcus.—(Author's abstract.)

PANAMA CANAL ZONE QUARANTINED AGAINST FOOT-AND-MOUTH DISEASE

Owing to the prevalence of foot-and-mouth disease in several sections of Ecuador, the chief health officer of the Panama Canal has issued an order excluding shipments of alfalfa or hay originating in Ecuador into the Panama Canal Zone. Although the disease has been known to be present in South American countries, it has not been until recently, serious in Ecuador and other regions near the Canal Zone. The U. S. Bureau of Animal Industry has been notified of the quarantine order affecting the Canal Zone and its inspectors at Southern ports of entry are exercising special vigilance.

Dr. Lowery, Eastern Division Supervisor of the Canadian Health of Animals Branch, is making a tour of inspection in Western Canada.

Dr. J. A. Barger, President of the Mississippi Veterinary Medical Association, reports that as a direct result of tick eradication in his State there is a better tone to the cattle market than has existed for some time past. In addition, the dairy products of Mississippi have advanced from \$750,000 in the past few years to more than \$15,000,000 in 1921. One small dairy section, where during the first year of the dipping in 1917 only \$84,000 worth of dairy products were sold, produced in 1921 over \$500,000 worth of the same products, and in April, 1922, their dairy business was 50 per cent greater than for the corresponding month of the previous year.

ARMY VETERINARY SERVICE

CHANGES IN ARMY VETERINARY CORPS

Lieut. Col. J. A. McKinnon has been ordered to Washington to the Army Medical School, and it is understood that he will be Director of the Veterinary Corps upon the transfer of Col. Morse. It is also reported that Major W. R. Pick will relieve Lieut. Col. Stanclift.

Col. McKinnon was born in Canada. He entered the United States Army from Montana, and was sent at once to the Philippines. In 1910 he returned and took a postgraduate course in Toronto University. During the war while in the Philippines he was sent as Chief Veterinarian to the American Expeditionary Force in Siberia. At the close of the war he was ordered to the Meat and Food Inspection School at Chicago, graduating in 1921.

The veterinary profession of the United States will be pleased to learn that a veterinarian has been selected to take charge of the Army Veterinary Service, and they will give Col. McKinnon their hearty assistance in making this Service better and more efficient in every way.

Veterinarians, both civil and military, owe a debt of gratitude to Col. Morse, who has so ably directed the Veterinary Corps during the formative stages, and their best wishes go with him on his assignment to other work.

THE BUCK PRIVATE AND THE CADUCEUS ¹

By MAURICE C. HALL
Washington, D. C.

Whin Oi wint into the Arrrmy
Oi was so very grane,
Oi had to ask of iverything
And just what did it mane.
There was so much insignia
Oi made some grand mistakes,
But the wan that fooled me mostly
Was the rod wid twisty snakes.

Sure, the crossed swords is the cavalry;
The doughboys has crossed guns;
Crossed cannons is artillery,
Both big and little ones.

¹ Written for the third annual dinner of the Helminthological Society of Washington, D. C., April 1, 1922.

The Q. M. has a little wheel;
 A shell the Ordnance takes;
 But who's the man that wears the rod
 That's twined wid twisty snakes?

Well, Oi wondered on this mather
 Fer at laste a week or two
 Till Oi woke up one fine morning
 Wid an awful case of flu,
 And at sick call Oi reported
 And he sez: "Oi know these fakes.
 Just mark him 'Duty,' sarjent,"
 Sez the bird that wears the snakes.

Whin Oi tells it to me comrades,
 They sez: "Sure, it's always so.
 If it's just a bluff yer pulling,
 To the hospital ye go.
 But whin wid the flu yer falling,
 Or yer blooming leg ye breaks,
 'Just mark him "Duty," sarjent,'
 Says the guy that wears the snakes."

MISTAKES

When a plumber makes a mistake, he charges twice for it.

When a lawyer makes a mistake, it is just what he wanted,
 because he has a chance to try the case all over again.

When a doctor makes a mistake, somebody buries it.

When a judge makes a mistake, it becomes the law of the land.

When a preacher makes a mistake, nobody knows the difference.

When an electrician makes a mistake, he blames it on induction; nobody knows what that means.

When a printer makes a mistake, he gets the "devil."

But when an editor makes a mistake, GOOD NIGHT!!!—*Ex.*

Dr. Wm. H. Mahon, who was formerly corporal in Company No. 1 of the Veterinary Corps, Camp Greenleaf, Ga., has been appointed as Inspector of Meat, Slaughtering and Provisions at Pittsfield, Mass. The "old buddies" of the Doctor will be pleased to learn of this recognition.

The report has reached this country from England of the death of one of Princess Mary's favorite horses, which succumbed to tuberculosis within the last few days.

ASSOCIATION NEWS

OFFICIAL ROUTE TO ST. LOUIS

One of the best features of going to a convention is the opportunity one has of meeting his fellow practitioners, and engaging in conversation with them, not only at the convention, but in going to and from the meeting.

In order to give the members an opportunity of traveling together, because the Wabash Railway covers a considerable portion of the territory in the Central West, the Wabash has been named as the official route for the next A. V. M. A. convention, St. Louis, beginning August 28.

Trains will leave Buffalo, Toledo, Chicago, Des Moines and Omaha at convenient times and convenient hours so that the members can arrive in St. Louis early Monday morning. The Wabash Railway promises to extend every courtesy to the members of the A. M. V. A.

N. S. MAYO, *Secretary*.

THE A. V. M. A. CLINIC

On August 30 and September 1 the A. V. M. A. expects to hold the largest and best veterinary clinic ever held in the United States. Dr. Huggins, B. A. I. veterinarian in charge at East St. Louis, and the Stock Yards Company are arranging a pavilion for the large animal clinic, and the small animal clinic will be probably held in the assembly room of the Exchange Building.

The material for the clinic is so planned that everyone can see without crowding and the clinic will be carried out on a definite schedule. Dr. Kingman of Colorado, Director, and Dr. T. L. Stewart of Kansas, Assistant Director of the large animal clinic, are men of wide experience who do things. Dr. Flynn of Kansas City is well known as a small animal clinician and he is going to give the canine practitioners an up-to-date clinic.

It is expected that those members who are not particularly interested in the clinics can attend sessions of the Section on Sanitary Science and Police or Education and Research that will be held at the Planters Hotel at the same time the clinics are being carried out.

SOUTHEASTERN STATES VETERINARY MEDICAL ASSOCIATION

The sixth annual meeting of the Southeastern States Veterinary Medical Association, which was held at Nashville, Tenn., in March, was one of the best conventions that the Association has ever enjoyed. The attendance was unusually large considering the present financial situation of the country.

The convention was presided over by President Dr. M. R. Blackstock. Mr. J. O. Tankard welcomed the association on behalf of the city of Nashville, to which Dr. W. A. Barnette responded.

The President's address outlined the history of the association and predicted a great future for the veterinary profession in the South.

Dr. A. T. Kinsley, President of the American Veterinary Association, addressed the convention on "The Veterinarian's Future." His views were very optimistic, yet they were substantiated by convincing facts about the profession.

One of the most interesting and instructive papers ever presented to the association was given by Dr. Louis A. Klein, University of Pennsylvania, on "Mastitis." He presented many new features about the cause and treatment of this disease.

A unique feature of the program was a moving picture illustration and discussion of "Intestinal Parasites in Swine," presented by Dr. E. I. Smith, through the courtesy of Dr. B. H. Ransom, Chief of Zoological Division, B. A. I.

A clinic was planned by, and held at the hospital of, Dr. W. M. Bell. An interesting feature of the clinic was a discussion and treatment sterility by Dr. J. F. DeVine, Goshen, N. Y.

Other features of the program were: "Scours in Young Cattle," by Dr. M. Jacob; "Experience with a Recent Outbreak of Anthrax," by Dr. C. C. Brown; "Tuberculin Accredited Herd Campaign in Virginia," by Dr. J. G. Ferneyhough, and "The Practitioner's Relation to Sanitary Control Work," by Dr. G. R. White.

The growth of the Association may be noted by the election of thirty-two new members at this session and by the interest shown in this meeting.

The date of the meeting of the association was changed by

unanimous vote and a permanent date fixed for the third Monday and Tuesday of November in each year. The next meeting will be held at Chattanooga, Tenn., November 20 and 21, 1922.

The Secretary's report showed that during the past year death had claimed the following members: Drs. W. A. Downs, Cordele, Ga.; M. A. Morris, Savannah, Ga., and L. R. Gerstung, Lakeland, Fla. Resolutions of sympathy and respect were adopted and copies mailed to their respective families.

In the absence of Dr. Tait Butler, Dr. J. G. Ferneyhough acted as toastmaster at the banquet held at the Hermitage Hotel.

The following officers were elected and installed for the coming year: President, Dr. W. M. Bell, Nashville, Tenn.; First Vice-President, Dr. W. K. Lewis, Columbia, S. C.; Second Vice-President, Dr. M. Jacob, Knoxville, Tenn.; Third Vice-President, Dr. A. L. Hirleman, Atlanta, Ga.; Secretary-Treasurer, Dr. John I. Handley, Atlanta, Ga.

JOHN I. HANDLEY, *Secretary-Treasurer*.

PROCEEDINGS OF THE WISCONSIN ASSOCIATION

The proceedings of the Seventh Annual Meeting of the Wisconsin Veterinary Medical Association, held January 18, 19 and 20 at Madison, Wisconsin, recently appeared in print. The Publication Committee, of which Dr. Frederick B. Hadley was chairman, deserves much credit for the attractive appearance of the publication.

IDAHO EXAMINING BOARD

The Idaho State Veterinary Examining Board met in the Capitol Building, Boise, Idaho, on May 9. Thirteen applicants were examined for license to practice veterinary medicine and surgery in the State of Idaho. The Board consists of R. B. Hurd, of Payette, president; H. E. McMillan, of Filer, secretary, and E. J. Pamell, of Lewiston, treasurer.

OKLAHOMA EXAMINING BOARD

The Oklahoma State Board of Veterinary Medical Examiners held the annual examination on June 26, 27, 28, 1922, at the State Capitol. Dr. D. W. Gerber, of Oklahoma City, is secretary of the Board.

INDIANA VETERINARY COLLEGE

The graduating exercises of the Indiana Veterinary College took place on May 19, the following students receiving diplomas: Carlos C. Byler, Callao, Mo.; Henry O. Chapman, Genoa, Ill.; Murray J. Dills, Decatur, Ill.; Hall A. Dockstader, Otranto, Iowa; Dolie Hancock, 330 Fulton St., Indianapolis, Ind.; Guy P. Hatchett, 603 Cherry St., Chattanooga, Tenn.; Ralph B. Hipenbecker, Fennimore, Wis.; Walter F. Holmgren, Platte, S. D.; Troy S. Hopkins, Eldorado, Ill.; Joseph G. Johnson, Gowrie, Iowa; Emmett E. Keigan, Middletown, Ind.; Norton H. Larson, Spring Grove, Minn.; Fred W. Milke, 605 5th Ave., Milwaukee, Wis.; Ralph G. Routon, Camby, Ind.; Francis D. Sexton, Hortonville, Wis.; William P. Tague, 1639 Wabash Ave., Chicago, Ill.; Thomas W. Todhunter, Wilmington, Ohio; Jasper B. Vance, R. R. B., Box 326, Indianapolis, Ind.; Jasper C. Vance, R. R. B., Box 326, Indianapolis, Ind.; Lee A. Wilcox, Clearfield, Iowa, and Ary S. Willard, Fairland, Ind.

Dr. George Hilton, of Ottawa, Canada, Chairman of the Executive Board of the A. V. M. A., has been ill for the last two months with nervous exhaustion. Dr. Hilton has been ordered to take a complete rest for several months more. THE JOURNAL wishes him a speedy convalescence and that he will be fully recovered in time to attend the St. Louis meeting in August.

Dr. Adolph Eichhorn and wife, of Pearl River, N. Y., left New York City on their European tour on June 3. During his trip Dr. Eichhorn will visit most of the European countries and it is expected that he will return in time to furnish an interesting report of his travels to the A. V. M. A. convention at its St. Louis meeting the last of August.

Dr. Guy Parker Hatchett, of Winchester, Tenn., and Miss Dolores Healy, of Indianapolis, Ind., were married May 24, at Indianapolis. Dr. Hatchett is a 1922 graduate of the Indiana Veterinary College and a member of the Theta Chapter of the Alpha Phi Fraternity. They will make their home in Chattanooga, where Dr. Hatchett will practice.

COMMUNICATIONS

TICK PARALYSIS

To the Editor:—

Upon reading the article in the April number of the JOURNAL under the heading "Tick Paralysis," Sidney Dodd, *Jour. Comp. Path. and Ther.*, Vol. 34 (Dec., 1921), part 4, pp. 309-323, the writer is reminded of an instance in his practice some thirty-five years ago at Circleville, Ohio, in which he was called to attend a number of horses owned by a man named Carpenter who lived in that vicinity. These horses, some of which were young, were running in a woods pasture and several were showing symptoms of paralysis. One or two were down and unable to stand even when lifted to their feet, and had to be hauled to the barn on a sled, after which they were put in slings, by the aid of which they were able to rest upon their feet.

Upon a close inspection numerous large ticks were found on the horses, located principally on the skin of the tail and neck at the roots of the long hair. These ticks were called wood ticks, but I did not know at that time, nor do I now know the technical name of the ticks. Upon removal of the ticks prompt recovery of all the horses took place. Even the one or two in which the symptoms were so pronounced that the animals could not swallow or rise to their feet, promptly regained a normal condition. In addition to removing the ticks medicines were administered, but the prompt recovery was attributed more to the change of location and removal of the ticks than to the medicinal treatment.

Whether the ticks were the causative factor of the trouble, or whether the injurious effects were caused by some other agency in the woods pasture I do not know; but at that time and ever since I have strongly suspected the ticks as causing the trouble.

During the summer of 1884, soon after I began practice, I met with an outbreak of paralysis in four horses, which deeply impressed me at that early date of the probability of serious toxic effects in animals, especially horses, from parasites. These horses showed symptoms of paralysis, and early in the attack lost the power of deglutition and later went down, being unable to stand. All four horses died, and in one which was examined after death the intestines were literally packed with parasites

of different varieties. There were fifteen tapeworms and several quarts of large roundworms. At that time this trouble was called cerebro-spinal meningitis. More recently, of course, such conditions are classed under different names, such as forage poisoning, etc. These horses were running on woods pasture and getting their drinking water from a pond.

Many other experiences in addition to the instances related above have impressed the writer all through his professional career with the strong suspicion that much greater harmful effects in animals result from parasitic and tick infestation than has been generally suspected.

G. W. BUTLER.

Indianapolis, Ind.

TWIN MARE MULE COLTS



To the Editor:—

I was called recently to deliver a horse colt, and this is what I got—twin mule colts.

This is unusual and may prove of interest to JOURNAL readers and the profession in general, so I am enclosing a photograph of them.

LINK GRIGSBY.

Walkerton, Ind.

NECROLOGY

Margaret C. Schaufler, wife of Dr. C. A. Schaufler, inspector in charge of the Bureau of Animal Industry station at Philadelphia, died on May 17 from a complication of kidney and heart troubles.

Mrs. Schaufler was an active worker in the Christian Church and was deeply interested in community welfare movements. Her own sunny disposition was radiated in her every-day life. She leaves a husband, son and a host of friends to mourn her loss.

MISCELLANEOUS

VERMINOUS VERSES

Again the Helminthological Society of Washington has had its annual dinner, and again Dr. Maurice C. Hall has perpetrated a lot of rhymes at the expense of his long-suffering colleagues. A few type specimens are presented below, and others will be given elsewhere.

Place card for the President, Dr. Cooper Curtice

One, two
Treatments will do.
Three, four
Will do more.
Five, six,
Dip the ticks.
Seven, eight,
Watch the date.
Nine, ten,
Dip again.

Little Bo-Peep

Little Bo-Peep
Has lost her sheep
From stomach-worm infestation.
She should have applied
Copper sulphate inside,
And kept up a pasture rotation.

To Dr. C. W. Stiles

Good little writers never say:
"You are a fossil or a cheese!"
O, no! That never is the way,
But: "May I differ, if you please?"
Good writers never make new names
In groups of which they nothing know.
They study the material first.
(It is a lot of trouble, though.)

To Dr. Albert Hassall and the Steel Memorial Medal

We'll say we're pleased you got it, sir!
The whole blamed bunch today is glad!
We know the pile of work you've done,
We know the sort of job you've had,
We know the pains you've taken, too,
With every single index card
That went into the catalogue—
And we'll say, too, that you worked hard!

We know the high and far-off days,
The old collections that you made;
We've seen the superstructures built
Upon foundations that you laid.

Of years full thirty-five have gone
 Since first you joined the B. A. I.
 May the good work go on for years,
 Achieve as much and rank as high!

And while we're on this subject, too,
 The Royal College has our thanks.
 Long may it turn out men like you,
 To swell the number in our ranks.
 Long may its judgment be as sound
 As when they gave this medal here.
 A toast to Doctor Hassall, then!
 And for the R. C. V. a cheer!

Reply attributed to Dr. Hassall

I am weary of having my photograph
 Printed with legends that make me laugh.
 It wouldn't have been so bad by half
 If it hadn't have been for that.
 But when the Steel Memorial was called
 A medal of steel, it surely galled.
 It's easy to see why I'm almost bald,
 And no need to blame my hat.

CORRECTIONS IN DR. BARNES' ARTICLE

IN THE paper on "Bovine Infectious Abortion," by Dr. M. F. Barnes in the JOURNAL for May, 1922, page 133, some unfortunate errors occurred. Corrections should be made as follows:

Page 134, second line, "because" should be "before," making the sentence read: "Bovine abortion was recognized as epizootic in nature before the cause was discovered." "Hudecoper" should be "Huidekoper."

Page 134, fifteenth line, the sentence beginning, "In conclusion with," should read, "In conjunction with," etc.

Page 138, in the seventh line of recommendation 27, the sentence should read: "It has not been proved that it does not do damage." (The first "not" was omitted, thus reversing the author's meaning. Evidently the double negative was too much for the printer.)

Page 142, first line, "6 to 120 days" should read "60 to 120 days."

It is suggested that readers make these corrections in their copies.

For the mistake in Huidekoper's name the JOURNAL has an alibi; for the others it must accept the blame.

All these errors, with one possible exception, are of a kind that is peculiarly difficult to detect in proofreading, as the erroneous form "makes sense" and there is nothing to attract attention to the error. Probably the best way of guarding against such mistakes is to send a proof to the author, but time does not always permit of this.

We regret exceedingly that Dr. Barnes was made a special victim of the "jinx" by the grouping of errors in his paper in a way that rarely happens.

UNKNOWN DISEASE KILLS MANY EWES IN KENTUCKY

For the third consecutive season an unusual condition again is developing among sheep in the State and causing the death of from six to eight per cent of the animals in different flocks, according to a report from the Kentucky Agricultural Experiment Station where studies are being made to determine the nature of the trouble and the best methods of controlling it. Observations made indicate that the condition occurs during February and March and is confined to ewes in advanced pregnancy. It is said to be fatal to practically 100 per cent of the animals that become sick.

Early symptoms of the disease are sluggishness and a tendency to lie down. Infected animals get up with difficulty, walk with a staggering gait and often with the head held to one side. As the disease advances, muscular twitching may set in and the animal stands with its head pressed against some object. Animals showing symptoms of the disease grit their teeth, gradually lose their appetite, become blind and breathe laboriously. The temperature remains normal. Before death the animals become prostrate and move their feet while lying on their sides.

While a number of investigations have been made on the disease, veterinarians at the station have been unable to find infectious organisms connected with it; attempts to transmit the disease to other sheep have been unsuccessful, and no growth has been recorded on culture media inoculated from the blood and tissues of sick animals. In several cases sick sheep were given an injection of botulinus antitoxin in an effort to determine the relation of the disease to forage poisoning, but in no case has the animal been benefited by the injection.

Preventive measures being recommended by the station vet-

erinarrians suggest that pregnant ewes be given good care, with as much variety of feed stuff as possible and that laxatives, such as salts or oil, be used freely. Exercise for the animals also is recommended.

NEW LIVE STOCK ESTIMATING AND REPORTING SERVICE PLANNED

Plans for a nation-wide livestock reporting service showing the monthly changes in the livestock situation on farms are now being made by the United States Department of Agriculture, under the Congressional appropriation recently made for this work. The service will also include the forecasting and reporting of the important livestock movements.

At recent conferences of statisticians and crop and livestock estimating experts it was felt that the monthly reports of changes on the farm should include reports of births, deaths, losses, marketings, purchases, and animals bred, with periodical classifications of the numbers of animals on farms. This service will be an expansion of experimental work carried on by the Division of Crop and Livestock Estimates during the last three or four years. Monthly reports will be obtained from 70,000 to 100,000 farms, and States indexes of changes at least for the corn belt, and Eastern and Southern States will be developed. The range States on cattle and sheep will be covered by a series of semi-annual reports because of the difficulty of getting monthly reports from those States.

The forecasting and reporting of the important livestock movements will be based upon the movement of feeder cattle and lambs from the range States to the corn belt feed lots, the movement from the feed lots to market, the movement into the Eastern feed lots such as Lancaster, Pa., and the movement out, the forecasting and estimating of the yearly lamb and calf crop of the range States, and estimates of the feeder hog movement in the Middle West. A careful study is now being made of possible methods for gathering and reporting this information.

At conferences held to develop a livestock reporting program, representatives of farmers' organizations, cooperative livestock shipping associations, the packing establishments, and other livestock interests were present. Many large livestock producers' associations in the West have also indicated a desire to cooperate.

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YOU SHOULD GO

ST. LOUIS will be the center of attraction for the American veterinary profession from August 28 to September 1, when the American Veterinary Medical Association holds its fifty-ninth annual meeting there.

The convention itself, with its fine program and good fellowship, is a sufficient attraction to warrant large numbers in making the trip. The papers and addresses will present much that is of great interest and benefit to all elements of the profession—general practitioners, specialists, educators, scientists and sanitarians. The clinics will be of special interest to practitioners. The cultivation of a professional spirit and the advancement of professional interests merit the consideration of all our members. The renewal of old and the formation of new friendships are a pleasing incidental feature of these annual gatherings. The entertainment features promise to be unusually enjoyable. The “regulars” who go from year to year will need no urging, and the veterinarian who has not had the privilege of attending previous meetings will find it well worth his while to go to this one.

Some very practical problems may come up for solution—questions of organization, commercial practices as they affect

the profession, etc. Our best thought should be given to solving these wisely, having in mind only the best and highest interests of the profession as a whole.

The city chosen offers many advantages. It is geographically central, so that the largest number should be able to go at the least expense. Twenty railroads contribute to its accessibility, and the splendid roads entering the city through neighboring States will undoubtedly tempt a number of pilgrims to motor to the meeting. The city abounds in features of interest to the visitor, some of which are enumerated elsewhere in this issue. St. Louis is known as the "friendly city," where visitors are guests and there are no strangers.

So you might as well arrange your business and personal affairs, make your hotel reservation and transportation arrangements, and GO!

THE SWINE INDUSTRY TODAY AND ITS STATUS AS TO HOG CHOLERA

ONE OF THE SERIOUS offenses in Colonial days was the theft of a hog. Penalty befitting the crime was meted out as rigorously as for gaming on the Lord's Day, using profane language, or kissing one's wife in public. This point serves to illustrate that from the earliest day of swine raising in America this class of animals has been recognized as a valuable asset in the feeding of the family and the ever-increasing population, and that any factor responsible for retarding the progress of the establishing of swine herds deserved immediate suppression.

From a small beginning as a family larder provider, the pork tribe has increased to proportions which are little short of marvelous. From a little plot in the back yard as their home these mortgage lifters have multiplied and progressed until fertile plains and shady pastures constitute their domain in practically all States in the Union, and the industry has become an important economic factor. The tiller of the soil who does not include in his scheme of agricultural production a remunerative herd of hogs is rare indeed. Such a farmer lacks foresight.

Though the development of the swine industry has had many setbacks, the quality and quantity of these domestic animals have increased and improved steadily from year to year. The value of hogs has climbed accordingly and the prices now paid for

both dams and sires of purebred stock are good indicators of what stock owners consider as desirable investments.

In the last few years there has been somewhat of a variation in the growth of the industry, due partly to the inflated values obtaining during the war and the inevitable reduction to normal figures following the cessation of hostilities. The peak of production was reached during 1918, the number of hogs on American farms January 1, 1919, being given as 75,587,000. On that date the average value of each animal was stated to be \$22.04, giving the country an item of national wealth amounting to \$1,665,987,000. From this there is noted a reduction to 72,909,000 hogs on January 1, 1920, with the value reduced to \$19.01 per head, decreasing the swine wealth to \$1,186,212,000. Perhaps the greatest decrease in the number of hogs raised in one year occurred during 1920, as the estimates give but 66,649,000 on farms January 1, 1921. With this decreased production and a lowering in price to \$12.99 per head, we note the total value shrinking to \$865,633,000—a little short of the billion-dollar mark. There may not be, for a great many years, the same enormous profits that were reaped during the war, but with the stabilizing of values under normal times, farmers will find that the swine herd is as profitable an investment as any other item of farm production.

As indicated, the building up, fostering and maintaining of such a vast industry have not been accomplished without many difficulties. It is a matter of record that in its early history, and in fact at various periods during its development, the industry has suffered severe drawbacks and losses from the effects of infectious and contagious diseases. For a number of years the breeding and raising of swine involved such uncertainties of success, owing to the ravages of hog cholera, that efforts for the increase of herds and numbers were discouraged and in some cases abandoned. In three successive waves of that disease occurring in 1887, 1897 and 1913-14, such severe losses were sustained that in some localities the industry was for a time practically destroyed.

FEDERAL ASSISTANCE

The United States Bureau of Animal Industry became interested in the problem of reducing losses from hog cholera many years ago. As early as 1904 it announced the discovery of a

serum which would protect hogs against cholera. After further experiments for the perfecting of this biological product, representatives of the various States were made acquainted with the methods of producing the serum. Armed with this new weapon the battle against hog cholera took definite shape, and in 1913, Congress having appropriated funds for that purpose, a series of experiments were inaugurated in the field to demonstrate the practical value of serum and determine the possibility of checking the disease. Following these experiments, their object having been accomplished, work was established in a systematic and intensive way, the methods of procedure being modified to conform with the cooperation offered by the authorities of the various States. In general, the plan is to assist the livestock regulatory authorities, such as State veterinarians, livestock boards and departments of agriculture in the investigation, suppression and control of hog cholera. Comparing the number of hogs destroyed by cholera in 1913 with that of 1919 and 1920, we find a reduction in losses of over sixty per cent. In previous years mortality rates have been as high as 144 per 1000. Under systematic efforts in fighting the disease the rate has been reduced to as low as 38 per 1000.

The swine industry of the present day has become so great and of such value that its care and protection form an important part of the activities of veterinary practitioners. In years gone by the treatment of hogs for diseases was considered a ridiculous idea. Today, however, the immense wealth represented in the industry and the nation-wide agitation for improvement of types make it of the utmost importance for the hog growers, State and Federal authorities, and the veterinarians in field practice to take all precautionary measures to safeguard the swine herds in every way.

DANGER OF MISTAKEN DIAGNOSIS

The tendency of laymen to engage in the diagnosis and treatment of diseases of livestock has, in a great many instances, resulted in losses of animals through the inability of such laymen to diagnose properly or their applying remedies not indicated in specific cases. This practice is particularly dangerous in the handling of infectious and contagious diseases where not only the original herd is at stake, but through the spread of

infection other animals may become exposed, infected and, perhaps, destroyed.

In the work of controlling hog cholera, for instance, perhaps the greatest hindrance has been the tendency of farmers to attempt the diagnosis and treatment of diseases in their own herds, or else call in an untrained layman who does not recognize the trouble or advises the wrong procedure in the handling of the outbreak. It is not always an easy matter to make a positive diagnosis of hog cholera, as symptoms are sometimes obscure, and due to the fact that other ailments of swine, such as pneumonia, digestive disorders, tuberculosis, etc., at certain stages of development somewhat resemble hog cholera, training and experience are required to differentiate between these and cholera. Since the result of treatment depends on proper diagnosis, it is important that swine growers should realize the value of professional services and advice in handling outbreaks of disease in swine herds.

Practicing veterinarians should acquire all possible knowledge pertaining to the control and suppression of hog cholera. Complications associated with cholera have created a multiplicity of opinions among those who claim to understand the various ailments of swine, and even within the veterinary profession hasty judgment has, in many cases, occasioned losses which could have been avoided through a careful consideration of facts, proper diagnosis and treatment. This should emphasize the necessity for the study of cases, getting the history, noting the environments, and all other circumstances involved in an outbreak before attempting to announce the diagnosis. Even after a thorough physical examination, observing closely for abnormal actions in breathing, gait, appetite, digestion and other functions, it is not always possible to make a positive diagnosis until a post-mortem examination has been made.

It is evident that all swine-producing localities should have someone available whose services, from training and experience, are reliable in detecting and prescribing for diseases of livestock. Farmers should realize generally that they can not afford to jeopardize the safety of their herds by attempting to administer treatment which requires a fixed amount of technical application of which they have no knowledge. It is far better to pay a fair fee to a qualified veterinarian than to run the risk of losing

valuable animals, to say nothing of the possibility of causing a widespread epizootic outbreak of a destructive animal disease.

COOPERATION OF VETERINARY PRACTITIONERS

Perhaps no one identified with rural community interests is so well fitted to judge of the needs for the betterment of livestock as the veterinary practitioner. Through his daily contact with conditions on the farm, noting the number of grades of animals in his community, he is in a position to have an excellent conception of the necessity for increased production, the selection of better types, and the proper care of herds. He realizes better than anyone else how costly and what a fallacy it is to allow each succeeding year enormous losses from diseases than can be prevented, if the proper advice is given, proper precaution taken, and proper care and treatment exercised. It is becoming more and more evident that veterinarians must look to the countryside for remunerative practice, and these professional men recognize that the more valuable the herd the better the chances for professional services. It follows that if infectious and contagious diseases are allowed to become rampant and destroy livestock, or discourage increased activities by farmers and breeders in building up greater herds and flocks, the services of veterinarians will not be in demand and their revenue will be decreased accordingly.

T. P. W.

The responsibilities and perils of editorship are well illustrated by a recent experience of *The Veterinary Record*, the official journal of the National Veterinary Medical Association of Great Britain and Ireland. This journal published a letter from an anonymous correspondent casting serious imputations upon the professional honor of Sir John McFadyean. *The Record* now publishes a statement repudiating the statements in the letter as "devoid of any foundation and entirely unjustified" and explaining that "the letter in question would never have appeared had the Editor seen it, but unfortunately he was away on his holiday at the time, and the letter was carelessly inserted by a subordinate." *The Record* has agreed to pay a sum by way of damages, which it is understood Sir John will donate to the Victoria Veterinary Benevolent Fund, and has also paid to Sir John's solicitors the costs to which he has been put.

A CONTRIBUTION TO THE BACTERIOLOGY AND PATHOLOGY OF STERILITY IN COWS, WITH REPORT OF NINETEEN CASES ¹

By DONALD C. BEAVER

With the collaboration of W. L. BOYD and C. P. FITCH
University of Minnesota, St. Paul, Minn.

INFECTIONS of the genital tract of cows have been attracting the interest of scientific investigators for many years. Stimulated by the discovery of the etiologic agent of bovine infectious abortion by Bang, workers have entered the field of comparative pathology in an effort to solve the problems of bovine sterility, which have become of great importance coincident with the increased prevalence of infectious abortion in cows. Contributions to the literature in this field have been for the most part clinical, although some notable work has been accomplished in bacteriology and pathology. Success of such investigations of great economic importance can be achieved only by concerted effort directed toward etiology. Although this paper deals only with the bacteriological and structural pathological considerations of the subject, there should be included at some future time more thorough investigations into the functional and chemical pathology. It is suggested that many of the problems of sterility lie beyond the vision of the microscope and that valuable additions to the literature on the subject might be obtained by careful study of sterility by workers in these branches of science.

In a general way, sterility may be said to result from either of two causes, first, congenital, and second, acquired. The congenital cause of sterility has as its underlying etiology the absence or arrested development of certain organs of reproduction. Acquired causes fall into two groups, inflammatory and non-inflammatory.

In the inflammatory group we must consider specific infections, such as are produced by *Bacillus abortus*, *B. tuberculosis* and *Actinomyces bovis*. There also exist the more important nonspecific inflammations, as those caused by the invasion of

¹Published with the approval of the Director as paper No. 381 of the Journal Series of the University of Minnesota, Agricultural Experiment Station.

parts of the female genitalia by *B. pyogenes*, streptococci and staphylococci. The female genital tract is composed of several structures, from vagina to ovary, the invasion of any one of which by pathogenic microorganisms may produce disastrous results. We must constantly guard ourselves in interpreting structural changes, as we see them, for it must always be borne in mind that although no related bacteriologic findings coexist, the changes in structure are in most cases associated with present or past infection. As a result of inflammation in one part of the genital tract, pathologic changes occur in another, while at the seat of the infection no visible changes in structure may be noted.

This is most clearly exemplified in the close relationship which exists between uterus and ovary, infections in one of which may produce structural changes in the other without apparently sufficiently disturbing the structure at the seat of infection to render the animal sterile. Infections as a rule lead to deviations from normal function, coincident with changes in structure. In some instances the changed structure, by purely mechanical means, may be sufficient to account for sterility. In other instances it is the resulting functional and biochemic change which is responsible for the loss of reproductive capacity. There still exists the possibility of pathologic disturbance, resulting from infection, being expressed only by changes in function, where the structural changes are not sufficient to be determined microscopically. In this last group may be placed many cases of sterility, the etiology of which can not be accounted for by either bacteriologic or pathologic study. In the light of our present knowledge a discussion of the latter is certainly theoretical and aims to cover ignorance rather than increase our knowledge.

In the noninflammatory group there may be included acquired displacements or injuries not resulting from infections, neoplasia, cysts and disturbed endocrine function. The environment of the animal may be an influencing factor in endocrine stability, and as such may be a contributing cause of sterility. These may include housing, feeding and breeding. The general condition of the animal with respect to undernourishment and excessive adiposity in all probability tends to suppress endocrine equilibrium, with consequent irregularities in the breeding disposition of the animal.

A discussion of some of the more important disturbances of the female genitalia with respect to etiology and pathology will be included. It is difficult to speak of disturbances in one part of the genital tract without relating them to consequent changes in other portions. It will be necessary, however, to adhere to a systematic consideration for brevity and lucidity. Such conditions as active and passive hyperemias, anemias and neoplasia are withheld from this report, except to mention them briefly in some instances.

DISTURBANCES OF THE OVARIES

I. Cystic changes are among the most frequently encountered pathologic disturbances of the ovaries. Ovarian cysts may be classified in the following manner:

1. Simple ovarian cysts (retention cysts).

- (a) Originating from the Graafian follicle.
- (b) Originating from the corpus luteum.
- (c) Originating from remnants of the Wolffian duct.

2. Neoplastic cysts.

- (a) Serous and pseudomucinous cystadenomata (benign).
- (b) Cystadenomata with carcinomatous change (malignant).

Retention cysts constitute the type most frequently encountered in the bovine. The Graafian follicle cyst results from failure of rupture of the follicle with consequent retention and accumulation of liquor folliculi. These cysts consist of essential elements of the Graafian follicle, with a degenerated ovum, an atrophic and flattened-out stratum granulosum and a usually increased density of the liquor folliculi. Other types may be due to disturbed or arrested development of the follicle, when, as a result cystic degeneration of so-called atretic follicles, cysts may result. The cyst resulting from the corpus luteum is seen when, in place of normal involution of the luteal structures, a cystic degeneration supervenes. Cysts of this character will be seen lined at first by flattened-out luteal cells, and later by hyalinized connective tissue and luteal detritus. The contained fluid is usually clear but may be sero-sanguineous in character. Remnants of the Wolffian duct are rarely seen as cysts in the ovary, but occasionally are encountered in the parovarian structures. Some workers have emphasized size as an indicator of

cystic ovaries. It should be borne in mind that cysts may be single, in which case they are eventually large, or they may be multiple, in which case they are usually small. Size alone is no criterion by which cysts may be defined.

Neoplastic cysts of the bovine ovary seem to be of relatively infrequent occurrence. They are supposed to result from continued tubular downgrowths into the ovarian substance, of Pflüger's egg cords, or from the germinal mesothelial structures surrounding the ovary. In any case the cyst is lined by simple or stratified epithelial-like cells. The arrangement of the epithelium may be simple or papillary, and the cyst may be single or multilocular. They are to be distinguished from retention cysts in that the cells are of an actively proliferating type, marked growth impulse being always seen. The epithelial lining secretes either a serous fluid or one in which pseudomucin predominates. Malignant cysts are essentially the same, with difference in growth restrictions.

The etiology of retention cysts is believed by many workers to be inflammatory. Rosenau and Davis (1)¹ have associated *Streptococcus viridans* with cystic ovaries in women. Fitch (2) in studies upon cystic bovine ovaries found streptococci and *Bacillus coli*. Ewing (3) states that the "fairly constant occurrence of inflammation of the pelvic organs points to the inflammatory origin of these cysts." Other workers, notably Loeb (4), have been able to produce ovarian cysts by underfeeding guinea-pigs. Only by excessively underfeeding was he able to produce the condition, but then with considerable regularity.

In our studies it has not been possible to isolate, with any degree of regularity, bacteria from retention cysts of the ovaries. It seems possible, in view of this, that cystic ovaries may be produced through reflex influence upon ovarian function which may take place from uterine infections.

II. Pathological retention of the corpus luteum is frequently seen. In some cases the yellow body undergoes continued evolution and atrophy. The luteal structures develop a fair degree of vascularity and become firmly encapsulated by connective tissue. As a result of this continued retention there is derangement of the diœstrous cycle.

¹ Numerals in parentheses following authors' names refer to list of literature at end of paper.

III. Inflammations of the ovary (oöphoritis) are acute and chronic. The acute types are most often associated with abscess formation from extension of peritonitis, perimetritis or salpingitis. Such infections when associated with salpingitis frequently result in the formation of tubo-ovarian abscesses. The abscess usually occurs at the site of a ruptured Graafian follicle. As the abscess develops the tube and ovary are brought into close apposition, so as to appear irregularly as one. It may develop to an enormous size, entirely obliterating the structures in which it occurs. Such abscesses result from invasion by *Bacillus pyogenes*, streptococci and staphylococci. Chronic oöphoritis is seen as an inflammation of lower grade, in which there are proliferative changes with lymphocytic or plasma cell infiltration, rather than exudative suppurative developments. The result of this type of inflammation is to leave a fibrotic ovary.

Specific infections of the ovary, such as tuberculosis or actinomycosis, are rarely observed.

IV. Neoplasia of the ovary in the bovine are rare and will not be considered in this report.

V. Sterility of the ovary in the bovine, as well as in other animals, is noted in the aged. As a result of long-continued rupture of Graafian follicles and production of corpora albicantia the ovary gradually becomes smaller and hardened. Such ovaries are usually functionless and are spoken of as sterile or senile ovaries.

DISTURBANCE OF THE UTERINE TUBES

The importance of diseases of the uterine tubes in relation to sterility can not be overestimated. It must be kept in mind that the uterine tubes or the oviducts are the connecting links between the ovaries and the uterus, and that the ova must pass through them in order to reach the uterus. It will be remembered that their lumen is narrow, their structure delicate and their mucosa thrown into plicæ directed toward the center, so that injuries, although slight, may result in temporary or permanent sterility. In this report only inflammatory conditions of the tubes will be considered.

Salpingitis may be acute, subacute or chronic, and affect any of the coats, and as such is designated as endosalpingitis or perisalpingitis. It is rather rare that the mucosa alone is at-

tacked. It is more usual to see all coats involved in the inflammatory process. The following classification will be found to include most inflammatory conditions of the tubes:

1. Catarrhal salpingitis (acute or chronic).
2. Suppurative salpingitis (acute or chronic).
 - (a) Pyosalpinx.
 - (b) Hydrosalpinx.

In general it may be said that salpingitis results only from bacterial infection. The most frequent organisms seen in association with these conditions are streptococci, *Bacillus pyogenes* and staphylococci. It is doubtful whether *B. abortus* or *B. coli* are responsible for pathologic changes in the uterine tube. Salpingitis as a rule is secondary to puerperal infection, but the possibility of its being primary must be also considered. Salpingitis is often bilateral, but is not infrequently seen affecting one tube, especially in the chronic stages.

1. Catarrhal salpingitis is acute in the early stages of mucosal inflammation. The chronic type, rarely seen, is the product of low-grade infection. Gillman (5) has recently placed emphasis upon this type of salpingitis. Our work has not been of sufficient extent to confirm his observation. In catarrhal salpingitis the mucosa is seen in a state of active mucus secretion. The walls of the tubes are edemic and infiltrated rather mildly with mononuclear types of cells. If the inflammation continues for a length of time the walls will thicken and become fibrotic and fusion may occur amongst the plicæ.

2. Suppurative salpingitis is usually acute in character. The tube is diffusely infiltrated with polymorphonuclear leucocytes, and much purulent exudate distends the lumen. The plicæ flatten out and are subjected to mild pressure atrophy. The walls at first undergo pressure changes, but later, due to the inflammatory stimulus, fibrosis occurs. In this stage free drainage exists toward the cornua uteri for the purulent material.

The chronic stage is dependent upon the continued progress of the infection. The tube from increased fibrosis undergoes greater kinking and deformation. The epithelial folds undergo hypertrophy and become adherent to one another through fibroblastic proliferation. Plicæ from one side of the tube may become adherent to those of the other side. The abdominal ostium of the tube becomes closed, and later the portion of the tube near the isthmus. At times the plicæ in their fusion leave areas lined

by columnar epithelium deep beneath their surfaces. These areas give the appearance of isolated glands below the mucosal surface. The tube becomes distended and the walls thinned from pressure. The adherent plicae become much thinned and stretched from pressure. This pus-distended tube is called pyosalpinx.

The bacteria gradually die and their products undergo lysis. The tubal epithelium regenerates to some extent and secretes mucus. This secretion, together with products of lysis, forms a clear, straw-colored fluid, distending the tube. In this state we speak of the condition as hydrosalpinx. The pathologic changes in this condition are clearly set forth in the case reports. In the human pyosalpinx and hydrosalpinx almost invariably form a retort-shaped tube with the small end near the uterus and the abdominal end adherent to the ovary. Adhesions to the ovary are as a rule seen in the bovine, but the retort-shaped tube rarely results.

Of the specific infectious diseases, tuberculosis and actinomycosis are found in the uterine tubes, the former more frequently. The pathologic changes resulting closely simulate changes characterizing these diseases in other locations. In tuberculosis, pyosalpinx and hydrosalpinx may result, but with slightly different changes.

DISTURBANCES OF THE UTERUS

Only the inflammatory conditions affecting the uterus will be considered. All types of inflammations of the uterus may easily be included in:

1. Catarrhal metritis (acute or chronic).
2. Suppurative metritis (acute or chronic).
 - (a) Pyometra.
 - (b) Cystic degeneration of uterine glands, etc.

Subacute stages also exist, but these are late acute or early chronic stages.

The etiology of metritis may be any one of the organisms listed, or, as perhaps is more frequently the case, two or more types in association. The list includes *Bacillus abortus*, *B. pyogenes*, streptococci, staphylococci, *B. coli*, *B. tuberculosis* and *Actinomyces bovis*. It may be for the most part assumed that metritis develops only as the result of infection, although

many times trauma and irritating chemicals predispose to invasion by microorganisms.

Eggink (6) in an analysis of 20 cases of acute and chronic metritis found the following organisms: *Bacillus tuberculosis* 12 times, *B. pyogenes bovis* 14 times, streptococci 12 times, *B. coli* 6 times, staphylococci 5 times, *B. proteus* 3 times, *B. subtilis* once. In many of these cases mixed infections were present, so that from analysis of his report the most important types appear to be *B. pyogenes* and streptococci. Except in one case of tuberculous metritis, either one or both of these important types were always found.

Lucet (7) first described *B. pyogenes bovis* in 1893, when he studied 52 cases of suppuration in cattle. In these he found *B. pyogenes bovis* pure 10 times and associated with other organisms 7 times.

Grips (8) later studied suppurations in swine, when he isolated rather constantly *B. pyogenes suis*. He concluded his type to be identical with *B. pyogenes bovis* (Lucet) and proposed the name *B. pyogenes* for both, a point generally accepted.

Künnemann (9) studied many cases of suppuration in cattle and concluded that *B. pyogenes* was the most important etiologic agent. He observed this organism in 90 per cent of cases, in 33 per cent of which he isolated it in pure culture and in 55 per cent associated with other organisms.

In a complete report of 18 cases (purulent, acute and chronic metritis) Wall (10) obtained comparable results. *B. pyogenes* was found 6 times, streptococci 4 times, streptococci and *B. pyogenes* 5 times, streptococci and *B. coli* once, streptococci, *B. pyogenes* and *B. coli* once, streptococci and an anaerobic bacillus once.

Ward (11) appears to have been the first to demonstrate the presence of *B. pyogenes* in this country. Since then the organism has occasionally been reported. Brown and Orcutt (12) in their "Study of *B. pyogenes*" worked with twelve strains of the organism, five of which were isolated from cases of purulent metritis.

The results of the present investigation support the concurrence of views already cited. It seems from our studies that streptococci and *B. pyogenes* play the most pathogenic rôles in metritis and other inflammatory conditions of the genital tract of the cow.

1. Acute catarrhal metritis is very frequently seen. It is the type of inflammation occasioned by organisms of low-grade virulence for the uterine structures. Probably *Bacillus abortus* is most often the exciting organism. Following the infection of the placenta and uterine cotyledons by *B. abortus*, an inflammation is occasioned which results in the premature delivery of the fetus. This organism is not capable of establishing itself in the normal involuted uterus and soon disappears from that organ following the abortion. If no secondary infection follows, only a mild acute catarrhal endometritis will ensue, marked by excessive mucus discharge, which, as involution takes place, will disappear without permanent changes remaining. The mucous membrane exhibits a patchy necrosis, mucoid degeneration and exudative phenomena. The necrosis is a normal accompaniment of involution of the uterus, an expression of the physiologic discharge of the maternal placenta and remnants of the fetal membranes. No permanent damage to the organ results if no further infection takes place. Wall (10) states that shrinkage and atrophy of the gland mucosa may occur, with probably similar changes in the carunculæ. A stimulus such as would be afforded by a mild type of infection might lead to hypertrophic endometritis, where the uterine mucosa is much thickened. Polypoid endometritis, doubtless inflammatory in its inception, may follow similar mild attacks or those of more severity.

Chronic catarrhal metritis, similar to acute, is usually seen involving only the endometrium. It is the expression of low-grade inflammatory reaction and is a rather rare occurrence. It may sometimes be seen as in the end stage of a more severe suppurative condition. Many times a condition of the endometrium simulating a chronic catarrhal endometritis is seen in which it is impossible to isolate organisms of any kind. It is suggested that cases such as these are not true metritis at all, but are an expression of altered ovarian function. A close study of the changes of the endometrium throughout the oestrous cycle supports this view.

2. Acute suppurative metritis in a vast majority of cases results from puerperal infection. It may follow either an abortion or a full-term parturition, especially when force is applied to aid delivery. Retention of the placenta in either case is a vital contributing factor of utmost importance. It has already

been shown that the bacillus of infectious abortion causes in itself only a catarrhal endometritis of short duration. It will be easily seen that although *Bacillus abortus* does not cause grave danger itself, it affords a lowered resistance of the uterine structures, and that during such time other pathogenic organisms may enter and cause a more severe reaction. Lowered resistance from other causes constitutes the same potential danger. The sloughing of the carunculæ should be regarded as an avenue for invasion. At times a purulent metritis is set up, which soon heals, leaving only slight sequelæ or none at all. In infections of this character a mucopurulent exudate is found in the lumen of the uterus, and the endometrium exhibits the ordinary exudative phenomena of acute exudative inflammation. The reaction may also include the muscularis and serosa. Sequential to this type of infection, increased fibrosis of the endometrium may result, together with hypertrophy of uterine and glandular epithelium. The uterine epithelium may exhibit a replacement of simple columnar type of epithelium by a stratified ectodermal type as seen in the portio vaginalis uteri. This process as observed by Wall (10) is called "ectodermoisering." Unless this type of metritis passes on to the chronic stages, these changes are as a rule not seen.

A more severe type of infection is occasionally found. Its etiology is practically the same as for the less severe, but more often has associated with it *Bacillus pyogenes*. The inflammatory reaction is greater, much more purulent exudate is formed, and usually involves all layers of the uterus, the parauterine structures, uterine tubes and ovaries. Large pelvic abscesses usually form. It sometimes happens that the purulent exudate within the uterus is not able to escape. The uterus fails to undergo involution (coincident with retention of the corpus luteum), and a uterus containing several liters of pus is the result. Such a condition is known as pyometra. Eventually partial drainage will establish itself if the animal survives, but the infection will persist. It is this persistent, severe, purulent metritis which, as it passes on to the chronic type, leaves a uterus certainly severely damaged, and many times with salpingitis, oöphoritis or pelvic peritonitis as sequelæ. In cases of sterility resulting from infections as just described, speculation is unnecessary when the pathology of the uterus is investigated. Even in these cases, experience has shown, under

proper treatment, it is possible to have complete recovery of breeding function; in other cases where normal estrum has been reestablished the animal fails to conceive, or if conception does occur, abortion frequently follows.

Chronic suppurative metritis has already been mentioned. It will only be necessary to describe the pathologic changes seen. These are fibrosis of the endometrium, hypertrophy of the muscularis and "ectodermosering" of the epithelium. The gland mucosa exhibits dilated and cystic glands, resulting from occlusion of their lumina through fibrotic stromal changes. The glandular epithelium is usually flattened out from pressure, and the lumen contains polymorphonuclear leukocytes and plasma cells. An area of dense, fibrous, often hyalinized connective tissue surrounds the dilated and cystic glands. In some areas there is actual atrophy of the glandular structures. The uterine blood vessels exhibit irregular intimal thickening, especially in the carunculæ. The cystic changes in the glands may be of such an extent that grossly the cysts stand out as small areas from the size of a millet seed to a pea (or larger). Such conditions are described most often as cystic degeneration of the uterus, but usually no attempt is made to associate this change with past infection. In the final stages, in place of cystic glands being the most prominent picture, a catarrhal reaction may supervene. This, together with lysis of dammed-up purulent exudate, will produce a condition simulating hydrosalpinx. This condition is spoken of as hydrometra.

In summing up the subject of metritis as related to sterility, Hallman (13) has expressed a very tenable view:

The lesions observed in varying degrees in the different cases are mucoid degeneration of the superficial epithelium, local and diffuse fibrosis of the uterine mucosæ, leukocytic infiltration of the stroma and gland luminae and degeneration and disintegration of the glandular epithelium with diminution in the numbers of glands. In the majority of cases the anatomical alterations are comparatively few and it is hardly conceivable that failure to breed was the result of loss of functional tissue of the uterine mucosæ.

In general, selecting cases of sterility as they come, our work bears out his opinion. The uterus seems especially capable of preserving itself for a long time without any marked structural damage resulting, so that it is more frequent to find, in sterile cows, a uterus in good condition so far as we can judge from structure.

DISTURBANCES OF THE CERVIX

The infections of the cervix can be classified in a similar manner to those of the uterus. The cervix is, however, more prone to become anatomically deranged. This is due to the deep cervical folds, which offer suitable abode for growth of micro-organisms. It is thus seen that the cervix may be the reservoir of virus, and from this source infections of the genital tract have their origin. As a result of inflammation the cervical folds hypertrophy and the epithelium undergoes frequently mucoid degenerative changes. Such conditions interfere with the breeding of the animal, but in many instances are relieved by proper medication and surgical manipulation. The chief danger lies in extension of the infectious process either by continuity or by metastasis through the pelvic lymphatics to other parts of the genital tract.

Of the specific infections, tuberculosis and actinomycosis are uncommon. The condition produced is in all essentials like that seen in other parts of the body as a result of invasion by the specific organisms of these diseases.

THE PRESENT INVESTIGATION

Method of Study

The object during the progress of this investigation was to study cases which were diagnosed by clinical procedure as sterile. Sterility in some instances was considered as absolute, and cases falling into this group were slaughtered and the genital organs studied both pathologically and bacteriologically. Clinical history, although not always complete, is available in all cases of this group, as are also bacteriologic reports of uterine swabbings, where possible to obtain. Other animals were presented at the University clinic for treatment by one of us (Boyd), and in a majority of cases responded favorably to the therapeutic procedures employed. Since the animals were valuable purebred stock, slaughter was held inadvisable. In these cases bacteriologic study combined with clinical data constitute the report. Cultures were also obtained from the genital tract (uterus) during the progress of the infection. This was accomplished in all cases by inserting sterile swabs into the uterus through the retracted and dilated cervical canal. At necropsy the genital organs were carefully removed and cultures sys-

tematically prepared. The medium employed consisted of 10 per cent sterile horse serum agar in slants. The medium was inoculated and sealed off with sealing wax and allowed to incubate at 37.5° C. from 10 days to 2 weeks undisturbed. By this method types such as *Bacillus abortus* would develop. Aerobic pour plates were prepared, using agar in combination with 5 per cent sterile defibrinated horse blood. By this method streptococci and *B. pyogenes* were most easily obtained in pure culture.

Cultures were identified individually. In the work with *B. pyogenes* the investigations of Lueet (7), Künnemann (9), Grips (8), Glaze (14) and Brown (12) were consulted. For the work on streptococci the monograph of Brown (15) and the studies of Hollman (16) have constituted the basis for classification. The publication of Winslow and others (17) has been adhered to rather rigidly in the classification of the staphylococci. Although it was difficult always to have agreement of types to conform with the classification, it was thought that it represented the best system yet devised.

As soon as possible after culture material had been obtained sections were taken from various parts of the genitalia for pathologic study. These were fixed in Zenker's solution and in 10 per cent formalin. Sections were prepared by paraffin and freezing methods. For the most part hematoxylin and eosin were employed for staining.

Case Reports

In all 19 cases were studied. One (No. 19) does not have a clinical history.

Case 1

Clinical History.—Jersey cow, age 5 years. First calf born at 2½ years of age, full term but born dead. Second calf aborted. Previous to abortion, agglutination reaction for *Bacillus abortus* positive in dilution up to 1-200. Six months following abortion was bred. Pronounced pregnant six weeks later. Examination one month following revealed animal to be non-pregnant. It is assumed that she aborted between first and second examinations for pregnancy. The animal never gave extreme evidence of œstrus. Bred frequently for one year following the probable abortion. Examination always showed normal genitalia. During last year blood of animal positive to

B. abortus (agglutination reaction), up to 1-1,000. History reveals prevalence of sterility in the herd from which she came. Mother and sister of this animal always conceived with difficulty. The animal's condition was considered incurable and for this reason she was slaughtered.

Necropsy.—Gross Description.—The genitalia appear normal excepting for persistent corpus luteum buried deeply in the stroma of the left ovary. The corpus luteum is 2.5 cm. in diameter. The center of this corpus luteum presents a cystic cavity 1 cm. in diameter.

Microscopical.—The vagina and cervix uteri are normal. The uterus presents degenerative changes of its innermost glandularis, characterized by pyknosis of nuclei, catarrhal changes in cytoplasm, increased mucus production and desquamation of epithelium. The stroma of the endometrium is fibrotic, an excess of collagenous connective tissue appears. The tubae uterinae are normal. The ovaries present many primordial follicles. Other follicles are atretic. These show increased cellularity and hypertrophy of theca folliculi, hypertrophy and hyperplasia of membrana granulosa. Some cells have pyknotic nuclei and a cytoplasm showing hyaline granular degeneration. Corpora albicantia are numerous throughout the ovarian stroma.

Bacteriologic Findings.—Uterus, uterine tubes and ovaries sterile. Vagina showed three types of organisms, *Staphylococcus aureus*, *Bacillus coli*, *B. subtilis*.

Diagnosis and Discussion.—The etiology of sterility in this case is not clear. It is possible that the deep-seated corpus luteum, present in the left ovary, was a contributing factor. The ovarian change seems insufficient to produce such a condition, likewise the changes of the uterus are hardly in themselves sufficiently pronounced to inhibit implantation of the developing embryo. Combination of ovarian and uterine disturbances is the most probable cause of the animal's sterility, possibly influenced by *Bacillus abortus* at some past time.

Case 2

Clinical History.—The animal was a Shorthorn heifer without history of pregnancy. Two breeding services permitted within one month. Following the second, a severe suppurative metritis and cervicitis was noted. Physical examination some time later revealed a severe suppurative metritis, adhesions of

genitalia to rectum and colon, an enlarged right ovary, cystic left ovary, and an enlarged right tuba uterina. Animal slaughtered after thorough examination.

Necropsy.—Gross Description.—Massive adhesions exist about all parts of the genitalia. The uterus and cervix are pyogenically infected. The tubæ uterinæ are dilated to 6 mm. The walls are thickened and fibrous and their lumina contain considerable purulent exudate. The left ovary presents a large, persistent corpus luteum, with cystic degeneration of the central portion of the ovary. The cyst measures 4 by 5 cm. in diameter. The left ovary is 6-8 cm. in diameter and is for the most part replaced by a large, centrally located abscess cavity containing a thick purulent exudate.

Microscopical Description.—The uterus presents an epithelium tending to exfoliate, cystic uterine glands, with atrophic and degenerative changes in the epithelial structures. The stroma and some glands show abundant evidences of long-continued suppurative infection, as is revealed by increased connective tissue with dilation of some glands through constriction of their necks and atrophy of others. There is a fairly abundant infiltration with polymorphonuclear and mononuclear types of cells. The muscularis is atrophic. The uterine tubes present an active, acute, suppurative process of fairly long duration. The predominant picture is that of pus-cell infiltration of the mucosa and adjoining structures. The walls are thickened. The right ovary shows fibrous replacement of ovarian structures, with focal polymorphonuclear infiltration. This constitutes the abscess wall as observed grossly. One section shows a cystic follicle with marked degenerative changes of its epithelial structures.

Bacteriologic Findings.—Uterus and uterine tubes, *Staphylococcus epidermidis*, *Bacillus coli*, *B. pyogenes*, *Streptococcus mitis* (Alpha type). Right ovarian abscess, *Staphylococcus aureus*, *Streptococcus mitis*. Right ovarian cyst. Sterile.

Diagnosis and Discussion.—Purulent cervicitis, metritis and salpingitis. Acute oöphoritis, and large corpus luteum cyst of left ovary. The etiology is in doubt only as to the predisposing cause of the infection. All changes described are the result of infection, and are of such a character that even though the active process might subside, the generative organs would be permanently damaged.

Case 3

Clinical History.—Heifer, 2 years of age. Delivered a dead full-term calf following severe dystocia at this age. Injury resulted which within five days was followed by severe, acute, purulent metritis. Parauterine abscesses soon developed. The abscesses were evacuated twice without improvement. Cultures obtained from the exudate showed *Bacillus pyogenes* and *Streptococcus anginosus* (Beta type). The animal became emaciated and developed a septic fever with loss of appetite. Slaughter was advised.

Necropsy.—*Gross Description.*—Extensive adhesions and deformity of the genitalia exist, resulting from large parauterine abscesses. The largest abscess is 14 by 10 cm. in size. The uterus presents hypertrophic carunculæ and an acutely congested mucosa. But little exudate is present in the lumen. The right uterine tube is normal, the left is completely obliterated by the large parauterine abscess. The right ovary shows a large corpus luteum and cyst measuring 17 mm. in diameter. The left ovary, like the left tube, is lost to view in the large parauterine abscess.

Microscopical Description.—The uterine glands show hyaline granular degeneration of epithelium, in some cases, with increased lymphocytic infiltration of the endometrical stroma. The right uterine tube is mildly catarrhal. The right ovary presents many cystic Graafian follicles measuring 2-3 mm. in diameter. The nuclei of cells in the membrana granulosa are markedly pyknotic, and the liquor folliculi is of increased density, being uniformly dense and homogenous and of deep eosin staining. One section shows a small corpus luteum cyst still persisting.

Bacteriologic Findings.—Body of uterus, sterile. Right horn, *Bacillus pyogenes*. Left horn sterile. Right tube and ovary sterile. Large abscess, *B. pyogenes* and *Streptococcus anginosus* (Beta type).

Diagnosis and Discussion.—Mild metritis; catarrhal salpingitis, right tube; cystic Graafian follicles and small corpus luteum cyst in right ovary; extensive periuterine and parauterine abscess formation. The etiology is clearly set forth. The changes observed in the Graafian follicles may be the reflex result of pelvic inflammation and disturbed uterine function.

Case 4

Clinical History.—Heifer delivered premature fetus at 2 years of age. Typical abortion exudate existed. Six weeks following the delivery examination revealed a left ovarian abscess the size of an orange. Abscess increased in size until hope of recovery was abandoned. Cultures obtained from the abscess by vaginal puncture showed the following organisms: *Bacillus pyogenes*, *Streptococcus fecalis* (Alpha type), *Staphylococcus candidus*.

Necropsy.—*Gross Description.*—In the left pelvic cavity an abscess 28 by 23 cm. has formed. Several smaller ones are also visible, the larger of these being 12-15 cm. and 6-8 cm. in size. The abscess contains purulent exudate with an extremely offensive odor, and massive pelvic adhesions exist. The uterine carunculæ are hypertrophic and hyperemic. The left uterine horn is deformed. The right uterine tube is normal, as is also the right ovary. The left tube and ovary are lost to view in the large abscess mass.

Microscopical Description.—The uterus shows only slight structural departure from the normal; there is edema of the walls, with tendency to epithelial desquamation. Increased cellular infiltration is also exhibited. The right tube is normal. The right ovary presents cystic follicles as described in Case 3. In some ova are seen a state of hyaline degeneration. Small cystic remains of corpora lutea and corpora albicantia are also seen.

Bacteriological Findings.—Uterus, right tuba uterina and right ovary are sterile. Parauterine abscesses, *Bacillus pyogenes*, *Streptococcus fecalis* (Alpha type), *B. proteus* and *Staphylococcus candidus*.

Diagnosis and Discussion.—Mild metritis, cystic degeneration of Graafian follicles of right ovary, periuterine and parauterine abscesses. The relative immunity of most of the genital tract from the infective process seems remarkable. The changes described for follicles of the right ovary are comparable to those reported in Case 3.

Case 5

Clinical History.—Aged Holstein cow. Aborted last fetus, following which severe purulent metritis developed. Recovery had apparently been made in three months. Had failed to con-

ceive in six months. Physical examination revealed a condition rendering the animal of no further breeding value.

Necropsy.—*Gross Description.*—The only gross pathology exhibited is in the right uterine tube and ovary. The tube is dilated to 1 cm. at the distal end, where it is also very tortuous. The lumen contains a clear, straw-colored fluid, which is inclosed in apparent multilocular cavities. At the fimbriated end of the tube the ovary is adherent through the development there of a tubo-ovarian abscess. The abscess contains a thick, purulent exudate and is surrounded by a dense wall which has for the most part replaced the normal ovarian structure. The left ovary contains a large corpus luteum.

Microscopical Description.—The sections of the uterus and left uterine tube appear normal. The right tube presents a normally appearing isthmus. Sections across the ampulla show walls of increased thickness, fibrous thickening of mucosal plicæ, and mild lymphocytic and polymorphonuclear infiltration. The plicæ are adherent to one another and have, it appears, been in places closed off so as to appear as multilocular cystic cavities. The epithelium is atrophic, from intrinsic pressure. The right ovary is sclerotic, and is diffusely infected. Some cystic Graafian follicles appear. The left ovary presents cystic degenerative changes in its medium-sized follicles, characterized by degeneration and atrophy of membrana granulosa, increased albuminous content of liquor so as to give it a uniform, deep eosin staining, glassy appearance. Some small corpora luteal remnants are persisting and cystic.

Bacteriological Findings.—Body of uterus and left horn are sterile, also the left tube and left ovary. The right uterine horn, *Bacillus pyogenes*. Right uterine tube, *B. pyogenes*, *Streptococcus ignavus* (Alpha type), *Staphylococcus candidus*. Tubo-ovarian abscess, *B. pyogenes*, *Streptococcus ignavus*.

Diagnosis and Discussion.—Right hydrosalpinx, right tubo-ovarian abscess, with sclerotic and cystic changes in right ovary. Cystic degeneration of Graafian follicles in left ovary. The existence of sterility in this case, where the active inflammatory process involved but one side, exemplifies the relation of ovarian function to uterine, and also of one ovary to the other.

Case 6

Clinical History.—Holstein cow, age 12 years. Last calf normal, December, 1919. The animal was bred at irregular inter-

vals, January, April and July, 1920. No history of disease. Examination in October, 1920, showed a bilateral hydrosalpinx, with large cystic ovaries. Sterility was considered as incurable, and slaughter was advised.

Necropsy.—Gross Description.—The internal os uteri presents cystic areas deep beneath the epithelial surface. A new growth, 2 cm. in diameter, located in the muscularis of the corpus uteri appears. The tumor is partially subserous. Growth is soft and well circumscribed. The uterus otherwise is normal. The right uterine tube is normal at the isthmus. Gradual enlargement occurs until a diameter of 1.5 cm. is obtained. The walls are thin and the tube runs a markedly tortuous course. The lumen contains clear serous fluid. The left tube is similarly altered. The right ovary presents a centrally located cystic corpus luteum. The left ovary appears normal.

Microscopical Description.—Cystic glands in the internal os uteri are characterized by low, flattened cuboidal epithelium with very irregular outlines. The contents of the cysts are densely homogenous and eosin staining. Sections of the tumor reveal a fasciculated structure of smooth muscle cells. The uterus is otherwise normal. The uterine tubes present fibrotic but thin walls of connective tissue. The epithelium of the mucosa is greatly flattened. The plicæ are stretched and converge toward the center of the lumen where connective tissue is much more abundant, giving the centrally converging folds great thickness. The adherent folds give the tube an appearance of multilocular cysts. A mild lymphocytic infiltration exists throughout. The ovaries are sclerotic and show cystic Graafian follicles as described in Case 5.

Bacteriological Findings.—Os uteri externum and corpus uteri, *Staphylococcus aureus*, *Staph. aurantiacus*, *Bacillus coli*, Cornua uteri, tubæ uterinæ and ovaries sterile.

Diagnosis and discussion.—Cystic glands in internal os uteri, leiomyoma of uterine body, bilateral hydrosalpinx, sclerotic ovaries with cystic Graafian follicles. In this case history of infection is lacking. In all probability a puerperal infection followed the last parturition, from which sufficient deformity occurred to produce the bilateral hydrosalpinx.

Case 7

Clinical History.—An aged Holstein cow. Last pregnancy, 13 months ago, was followed by retention of the placenta.

Physical examination disclosed a chronic cervicitis, hypertrophy of the external os uteri, associated with a deep-seated corpus luteum in the right ovary. Cultures prepared from the cervix gave the following growths: *Bacillus pyogenes*, *B. coli*, *Staphylococcus aureus*, *Staph. aurantiacus*. After three months of treatment, the animal's condition being regarded as incurable, slaughter was advised.

Necropsy.—Gross Description.—A large quantity of mucopurulent exudate exists in the vagina, the mucosa of which is inflamed. The Bartholin ducts are cystic, measure 2 cm. in diameter and contain a thick pseudomucinous material. The folds of the external os uteri are hypertrophic and the mucosa is studded with granular, vesicular areas, pin point in size. The cervical canal contains much thick, yellow, purulent exudate. The corpus uteri shows no change. The right cornu is indurated and is one-third smaller in size than the left. At the bifurcation of the uterus, on the serosa, above and to the right, an adhesive mass of tissue exists. At this portion the wall is hard and thick. The right cornu is flaccid and contains considerable pus; the left contains less. The right tuba uterina is distended to 1 cm. in diameter with clear serous fluid. The abdominal stroma is obliterated by a mass of dense fibrous tissue, 10 by 4 by 7 cm. in size. Mesenteric fat adheres to it so that a loop of the small intestine is brought into close apposition. This connective tissue mass is so constituted as to replace the normal ovarian structure, and in its center purulent exudate is shown. The left tuba uterina presents slightly thickened walls and is dilated. The left ovary is normal.

Microscopical Description.—The vaginal mucosa exhibits only mild desquamation of superficial cells. Sections of the cystic Bartholin ducts show only mild inflammatory exudate, with a cystic material staining faintly neutral, in which cholesterol clefts are plainly visible; tiny globules of neutral fat are also seen. The cervix shows proliferation of connective tissue and superficial epithelial cells. This proliferation has in many instances occluded the outlets of the cervical folds, so that gland-like structures lie buried beneath this tissue. The epithelial cells are catarrhal. The walls are diffusely infiltrated by plasma cells and large lymphocytes. The entire uterus shows marked structural changes. In one section the lining epithelium appears as stratified ectodermal, six to eight cells in thickness.

The change is abrupt, for at each end transition to simple columnar occurs at once. This change corresponds to that described by Wall (10) as "ectodermosering." The surface epithelium shows mucoid degeneration, except in the ectodermosised area. Beneath the epithelial surface the endometrium is densely infiltrated with leucocytes. Plasma cells predominate, while polymorphonuclear leucocytes and lymphocytes are also numerous. The uterine glands show marked atrophic changes. In some places, due to the proliferative changes about the glands, the ducts have been occluded. This has resulted in great dilation of the glands, with retention of mucus. They are irregular and tortuous in outline. The epithelial lining is now cuboidal in type. The uterine stroma is fibrotic and there is noticeable diminution of numbers of glands per field. The myometrium is involved in the inflammatory process. Bilateral involvement of the uterine tubes exist. The serosa and muscularis are increased in thickness and are edematous. The plicæ are hypertrophic and hyperplastic. They converge toward the center, where they are adherent, and where a large mass of connective tissue has proliferated. Due to this adherent condition and overgrowth of connective tissue, many folds have been brought together at their base so as to appear as acini of glands. All plicæ, even where adherent, are lined by a simple columnar epithelium. Focal aggregations of leucocytes are seen throughout the tubal walls. Both ovaries show dense focal lymphocytic infiltration. Large follicles show only changes expressed by increased density of liquor folliculi. Small follicles exhibit degenerative changes of ova and membrana granulosa. These changes are not marked and are difficult of interpretation. The right ovary is fibrotic.

Bacteriological Findings.—Os uteri and uterus, *Bacillus pyogenes*, *Streptococcus nonhemolyticus* (Gamma type), *Staphylococcus aureus*. Uterine tubes, right tubo-ovarian abscess and ovary; *B. pyogenes*, *Strep. nonhemolyticus*, *Staph. epidermidis*. The left ovary is sterile.

Diagnosis and Discussion.—Mild vaginitis, cystic Bartholin ducts, chronic purulent cervicitis and metritis, bilateral hydrosalpinx, right tubo-ovarian abscess, sclerosis of right ovary, bilateral chronic ovaritis and cystic degeneration of Graafian follicles. Discussion of etiology of sterility in this case is unnecessary.

Case 8

Clinical History.—Holstein cow, age 4 years. During last 10 months animal has been bred 12 times without conception. Last calf delivered normally. No abortion in this animal, but the disease existed in the herd five years ago. Necropsy was obtained.

Necropsy.—Gross Description.—The animal is poorly nourished. The genitalia are normal excepting for cystic-appearing Graafian follicles and a retained corpus luteum imbedded deeply in the substance of the left ovary.

Microscopical Description.—The vagina and cervix are normal. Superficial uterine glands are active, appearing according to Marshall's (18) description to be in the state of proestral activity. The uterine tubes and ovaries are normal.

Bacteriological Findings.—Os uteri externum corpus uteri and right horn, *Staphylococcus aureus*, *Staph. aurantiacus*, *Staph. candidus*. Left uterine horn, uterine tubes and ovaries are sterile.

Diagnosis and Discussion.—Any hypothesis of the etiology of sterility in this case, in the light of present knowledge, can only be speculative. The deeply seated corpus luteum found in the left ovary possibly influenced conception. If this had been enucleated that might have cleared up the condition. The undernourishment of the animal may have influenced endocrine stability, so that by general suppression of this important secretion ovarian sensibility was reduced.

Case 9

Clinical History.—Aged Holstein cow. Several calves were born normally before the animal failed to conceive. The animal had been sterile one year when brought to our attention. Physical examination revealed only a mild cervicitis. Necropsy was obtained.

Necropsy.—Gross Description.—Folds of the external os uteri are hypertrophic. The cervical canal presents a thick, tenacious discharge of mucus. In the wall of the corpus uteri, a well circumscribed, spherical, submucous tumor exists. The uterus is otherwise normal. The right tuba uterina is normal. The left tube is normal excepting for adherence of the fimbriated extremity to the ovary. The tube is here dilated and contains a clear serous fluid. The right ovary contains many follicles,

appearing cystic. The left ovary contains a normally appearing corpus luteum. No pathologic change is discernible.

Microscopical Description.—The cervix appears normal. The uterus shows only occasional fibrotic areas. Sections of the new growth described for the corpus uteri exhibit a fasciculated structure composed of smooth muscle. The left tuba uterina is normal, excepting at its tip, where it adheres to the ovary. At this point the plicæ adhere to one another and are greatly stretched and thinned, representing an arrangement of small, multilocular, cystic cavities. Occasional collections of lymphocytes are seen in the tubal wall. The right tuba uterina is normal. The left ovary shows cystic degenerative changes of medium-sized Graafian follicles, also atretic degeneration of smaller ones. The right ovary shows similar changes. Both are sclerotic.

Bacteriological Findings.—Os uteri externum, *Staphylococcus epidermidis*. Right cornu uteri, *Streptococcus mitis* (Alpha type). Corpus uteri, left cornu uteri, uterine tubes and ovaries are sterile.

Diagnosis and Discussion.—Leiomyoma of corpus uteri, hydrosalpinx of right tuba uterina, with adhesions to ovary, and sclerotic changes in ovaries with cystic degenerative changes of follicles. Sterility in this case can be accounted for histologically only by the hydrosalpinx of the right tuba uterina, sclerotic changes in the ovaries, and cystic degeneration of ovarian follicles. The cervical changes observed grossly were not expressed microscopically. The case exemplifies further the close relationship existing between ovarian function and sterility.

Case 10

Clinical History.—Four-year-old Holstein cow. Past history unknown. Physical examination revealed an occluded vagina, so extensive that slaughter was advised.

Necropsy.—*Gross Description.*—The vagina is closed just anterior to the urethral orifice. The stricture appears to be the result of an inflammatory reaction which brought the vaginal walls into close apposition and united them by scar tissues formation. The central part of the stricture presents an opening 3 mm. in diameter, communicating with the anterior vaginal structures. Anterior to the stricture the vagina is 1.5 cm. in

diameter, enlarging again at the external os uteri so as easily to accommodate this structure. The cervix uteri and uterus appear normal excepting for an enlarged and flaccid right horn. The right tuba uterina is enlarged to 8 mm. in diameter and contains a clear, straw-colored fluid. The lumen is crossed by strands of adherent mucosal folds, so that it is multilocular in appearance. The left tuba uterina is normal. The right ovary presents a cyst 2 cm. in diameter containing a clear, straw-colored fluid which coagulates upon leaving its cavity. The inner wall of the cyst is yellow to a depth of 2 mm. The left ovary is normal.

Microscopical Description.—The vaginal epithelium is irregularly exfoliated and is chronically infected. The cervix is normal. The corpus uteri shows extensive atrophy and fibrous replacement of uterine glands. Chronic infection is also exhibited. The cornua uteri present but mild changes, expressed by an edematous stroma, and maceration of superficial glands of the endometrium. The left tuba uterina is normal. The right tube is dilated at its ampulla and corresponds histopathologically to the descriptions previously given for hydrosalpinx, excepting that there is no adhesion of folds. The mucosal structures are flattened out and lie against the wall. A few normally appearing folds remain. The right ovary shows fibrosis of its stroma. Some follicles are degenerated, as exhibited in one by atrophy of membrana granulosa and theca folliculi, with proliferation of connective tissue about the ovum, entirely obliterating the cumulus oöphorus. The liquor folliculi is of increased density. Sections through the large corpus luteum cyst show an inner thin, edematous, connective tissue lining, beneath which organized luteal tissue exists. The left ovary is normal.

Bacteriological Findings.—All organs found sterile excepting right cornu uteri, which gave a growth of *Staphylococcus epidermidis*.

Diagnosis and Discussion.—Stricture of the vagina, mild chronic proliferative changes of corpus uteri, with atrophy of glands, right hydrosalpinx, atretic and cystic degeneration of right ovarian follicles, and right corpus luteum cyst. Sterility in this case would have been absolute, with only the vaginal lesions. The uterine changes, and hydrosalpinx as is the vaginal change too, are the end result of chronic infection. The

presence of staphylococci in the right cornu uteri may be an expression of this passing infection.

Case 11

Clinical History.—Scrub cow, age $3\frac{1}{2}$ years, used as control in the University infectious abortion project. Animal never reacted positively to agglutination test for infectious abortion. The animal was always difficult to get with calf. A normal calf was born at the age of $2\frac{1}{2}$ years. A second calf was born normally at the time of this study, but died three days following birth. The cow developed, within the first week post partum, a mild, purulent vaginal discharge. The animal was slaughtered in order to complete the records, and study was undertaken to determine, if possible, the etiology of the infection and pathologic changes coincident with it.

Necropsy.—*Gross Description.*—The vagina contains considerable viscid mucous discharge streaked with pus. The cervix is normal. The endometrium of the uterus is deeply congested and the lumen contains a bloody purulent exudate. The carunculae are large and prominent. The uterine tubes and ovaries are normal.

Microscopical Description.—The uterine wall is infiltrated with pus cells and the vessels are filled with blood. Some red blood cell extravasation exists. There is mild desquamation and necrosis of lining epithelial cells. The uterine tubes are actively congested. The right ovary is normal. The left ovary shows several atretic and cystic follicles. The cystic change is as before described.

Bacteriological Findings.—Uterus, *Streptococcus viridans* (Alpha type), *Staphylococcus epidermidis*, *Staph. aureus*, *Sarcina lutea*, *Torula rosca*. Uterine tubes and ovaries are sterile.

Diagnosis and Discussion.—Mild puerperal endometritis. No evidence of permanently damaged genitalia exists.

Case 12

Clinical History.—Holstein cow, age 7 years. Gave birth to calf at 2 years of age, and since that time has had irregular estral periods and always failed to conceive. Abortion disease not prevalent in the herd from which she came. Necropsy obtained.

Necropsy.—*Gross Description.*—All structures appear normal.

Microscopical Description.—The uterine epithelium in places is hyperplastic and hypertrophic. In these areas the cells are stratified to 6 or 8 layers in depth. The uterine tubes are normal. Both ovaries present many Graafian follicles exhibiting the following changes: The cells of the membrana granulosa are degenerated with pyknotic nuclei. The normal light liquor folliculi is replaced by a dense coagulum taking a neutral stain. The cells of the cumulus oöphorus are for the most part degenerated. The ovum presents a hyaline eosin-staining structure. Other follicles show a dense liquor folliculi with stretching and pressure atrophy of the membrana granulosa.

Bacteriological Findings.—All cultures from cervix, uterus, tubes and ovaries remained sterile.

Diagnosis and Discussion.—Bilateral cystic degeneration of ovarian follicles. These changes are the only ones, histologically, sufficient to produce continued sterility.

Case 13

Clinical History.—Holstein heifer, age 2 years, without history of disease. Physical examination revealed an occluded vagina and undeveloped uterus, round sac-like structures, connected with ovaries. Slaughter advised. Necropsy obtained.

Necropsy.—Gross Description.—The vagina is 5 cm. in length, being occluded at that point by union of its walls. From this point the uterus is represented only by nearly solid cords, bound beneath a single areolar sheath. The length of these tubes as they run parallel to one another is 30 cm. At this point they divide into right and left and proceed forward and outward approximately 14 cm. At this point each enlarges into a partially developed thin-walled sac containing a turbid yellow-colored fluid. The right sac measures 9 by 10 cm. and the left 9 by 5.5 cm. The tubæ uterinæ are normal. The ovaries are large and contain many follicles possessing a semi-solid white liquor folliculi. The left ovary in addition presents a normal corpus luteum.

Microscopical Description.—Sections through the remains of the Müllerian tubes show a low cuboidal epithelial lining. Beneath this the connective tissue is dense and for the most part collagenous in type. Smooth muscle bundles are unevenly distributed through the connective tissue stroma. In the partially developed uterus the mucosa is lined throughout with a low

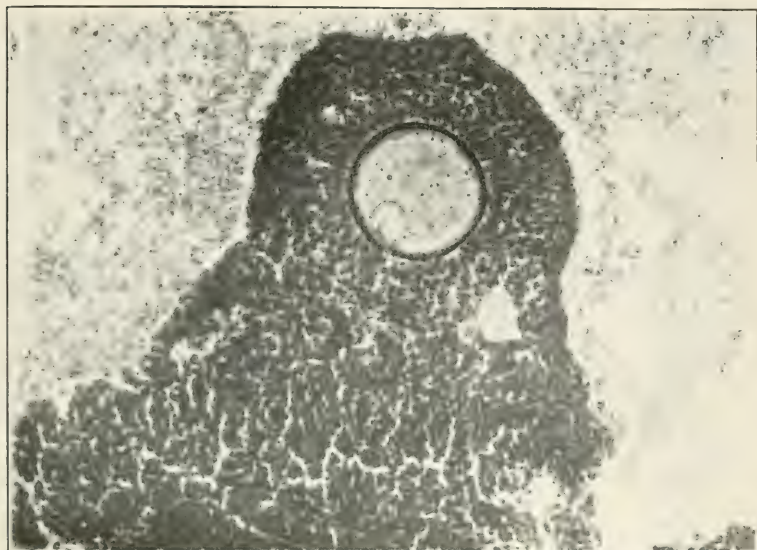


Fig 1—Normal follicle, Case 2, showing ovum surrounded by the cells of the cumulus oophorus. Note the granular character of the liquor folliculi coagulum.

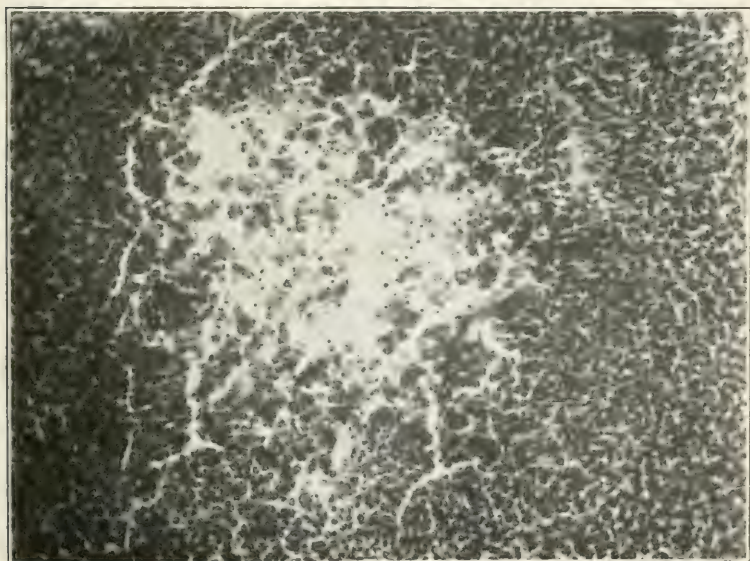


Fig 2.—Graafian follicle, Case 1, showing degenerative change. Note thickening of stratum granulosum and theca folliculi.



Fig 3.—An example of cystic degeneration of Graafian follicle, Case 5. Note dense coagulum replacing normal liquor folliculi and degenerative changes in cells of stratum granulosum (not marked in this case).



Fig. 4.—Section through ovary, Case 9. Note uterine tube adherent to ovary, the multilocular cavities characterizing hydrosalpinx. Two Graafian follicles showing cystic degeneration are seen in the ovary, also corpora albicantia.

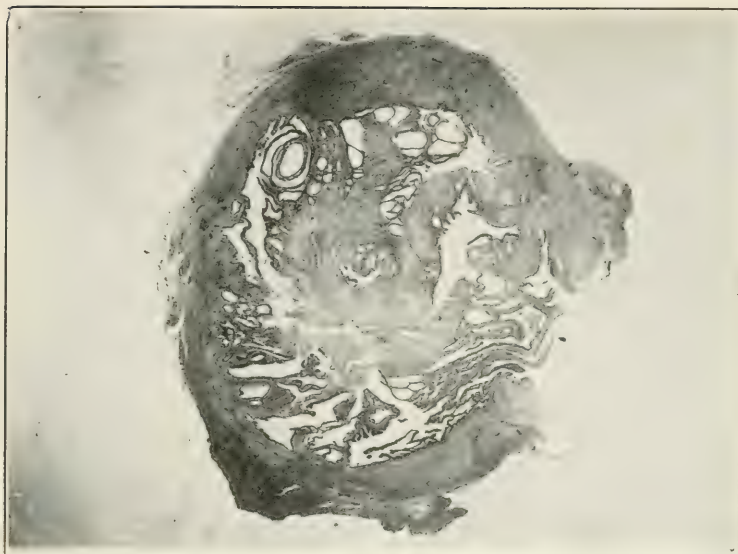


Fig 5.—Low power of uterine tube, Case 5. Hydrosalpinx, early stage.

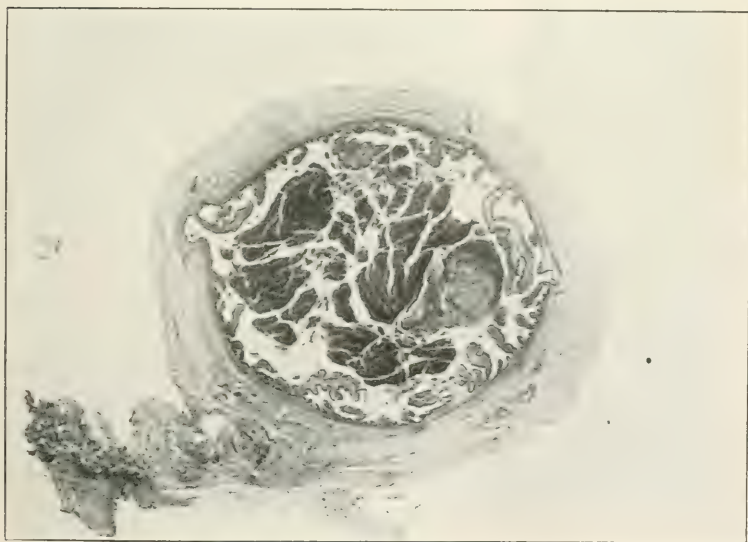


Fig. 6.—Purulent salpingitis, Case 2. Low-power section of uterine tube. Note the purulent exudate in the lumen.



Fig. 7.—Section through caruncula, Case 7. Note great thickening of uterine epithelium. Stratified over caruncula and simple columnar at the border. "Ectodermoising."



Fig. 8.—Dilated uterine glands, Case 2. There is considerable destruction of the glandular epithelium. Other deeply stained glands in same section remain normal.

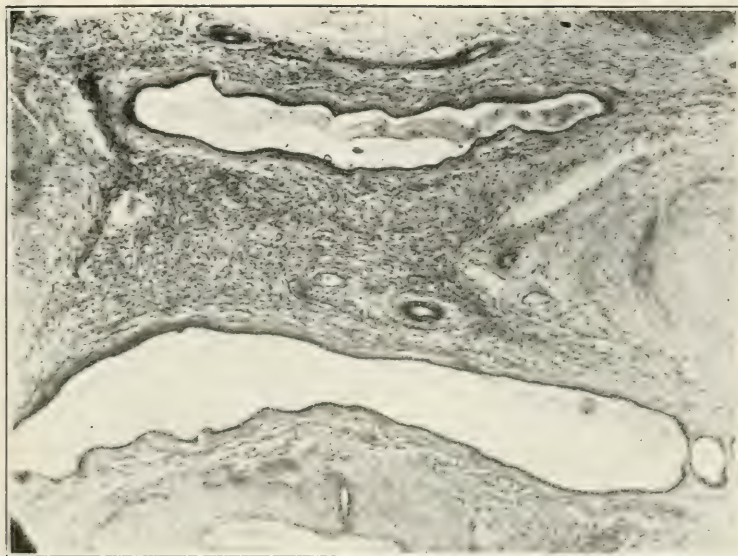


Fig 9.—Section through wall of uterus, Case 7. Note fibrosis of uterine stroma, dilation of uterine glands and atrophy of glandular epithelium.



Fig 10.—*Bacillus pyogenes*, Case 18. Note the characteristic clusters, parallel grouping and diphtheroid types.



Fig. 11.—Gross specimen, genitalia, Case 4. Shows extensive periuterine abscesses.

type of epithelium, stratified in most instances. The epithelium of the glands is macerated. The walls are thin and very edemic. The muscular coat is especially undeveloped. The uterine tubes are normal. In the ovaries medium-sized Graafian follicles are exceedingly numerous. These exhibit quite uniformly a theca folliculi of increased thickness, a quite normally appearing membrana granulosa and a liquor folliculi of increased density, staining neutral. In the sections studied no ova are seen.

Bacteriological Findings.—Cultures prepared from the partially developed uterus, tubes and ovaries remained sterile.

Diagnosis and Discussion.—A case of absolute sterility from partially arrested development of the genitalia. Multiple cystic degeneration of the follicles as described in this case are frequently seen in the ovaries of young girls. They correspond histologically to the cystic changes described for ovaries in other cases herein reported.

Case 14

Clinical History.—Similar to Case 13.

Necropsy.—*Gross Description.*—This corresponds "almost identically to that described for Case 13.

Microscopical Description.—Essentially the same as for Case 13.

Bacteriological Findings.—All cultures from various areas remained sterile.

Diagnosis and Discussion.—Partial arrested development of the genitalia and cystic degenerative changes of the Graafian follicles.

Case 15

Clinical History.—Aged Holstein cow. Normal calf delivered November, 1920. Parturition was difficult owing to a breach presentation. Severe purulent metritis and cervicitis soon followed. Cultures from the cervix and uterus gave the following growths: *Bacillus pyogenes*, *Streptococcus pyogenes* (Beta type), *Staphylococcus aureus*. The animal responded to the treatment employed so that within four months her condition was apparently normal. Pregnancy had not yet occurred at end of seventh month following parturition. (Note: This animal is in calf from December 4, 1921, service.)

Diagnosis and Discussion.—Purulent cervicitis and metritis, acute in type, and caused by *Bacillus pyogenes*, *Streptococcus pyogenes* and *Staphylococcus aureus*.

Case 16

Clinical History.—Aged Guernsey cow. Delivered a normal calf in June, 1920. The placenta was retained, following which a severe purulent metritis developed. The owners gave the animal but little attention until January, 1921. Examination at this time revealed a deeply seated corpus luteum in the right ovary. The cervix uteri was inflamed and the cervical canal partially open. The uterus was enlarged, flaccid, and abdominal in position. The persistent corpus luteum was enucleated four days later. The uterus then contracted and within 24 hours had expelled 4 to 5 liters of pus. The pus was malodorous. Cultures prepared from this material revealed two types of organisms, *Bacillus pyogenes* and *Streptococcus viridans* (Alpha type). Recovery was progressive and regarded as complete after two months. Examination in May, 1921, revealed the development of a right tubo-ovarian abscess. The animal, although bred, was not pregnant.

Diagnosis and Discussion.—Pyometra, cervicitis, and tubo-ovarian abscess, the etiology of which is *Bacillus pyogenes* and *Streptococcus viridans*.

Case 17

Clinical History.—Holstein cow, age 5 years, produced a normal calf in November, 1920. Following parturition the placenta was retained. Purulent metritis developed, but received no special attention until March, 1921. Examination revealed cervicitis, an extensive pyometra, cystic left ovary and corpus luteum in right ovary. The cyst was ruptured and corpus luteum enucleated. Malodorous, thick, creamy pus began to flow freely from the vagina within 24 hours. Swabs taken of the purulent exudate gave growths of *Macillus pyogenes* and *Staphylococcus epidermidis*. Recovery was rapid, the exudate having practically cleared away at the termination of two weeks. Later sold at public sale as a healthy individual.

Diagnosis and Discussion.—Pyometra and cervicitis following parturition caused by *Bacillus pyogenes* and *Staphylococcus epidermidis*.

Case 18

Clinical History.—Holstein cow, age 6 years. Delivered a normal calf in November, 1920. The placenta was retained following parturition, but was promptly removed. A purulent

metritis followed, but received no attention until March, 1921. Physical examination at this time revealed an elongated, large uterus and large, persistent corpus luteum. The corpus luteum was enucleated, following which large quantities of pus were discharged from the uterus. Cultures prepared from this exudate gave growths of *Bacillus pyogenes*, *Streptococcus viridans* (Alpha type), *Streptococcus* (Gamma type), *Staphylococcus aureus* and *Staphylococcus epidermidis*. Recovery was apparently complete at the end of one month.

Diagnosis and Discussion.—Cervicitis and pyometra, the etiologic agents of which may be considered as *Bacillus pyogenes*, streptococci and staphylococci. This animal is now pregnant.

Case 19

Clinical History.—Not obtainable. Necropsy secured.

Necropsy.—*Gross Description.*—Vagina and cervix are normal. The uterine horns are much deformed and irregularly enlarged. Sections through the walls reveal multiple tubercle formation, with slight flocculent, yellowish exudate in the uterine lumen. Both uterine tubes present closed and enlarged abdominal stomata, the walls at these points being hard and studded with partially necrotic, partially calcified tubercles. The ovaries are normal. The pelvic peritoneum is diffusely studded with tiny miliary tubercles.

Microscopical Description.—The uterus exhibits many tubercles throughout the wall, especially in the endometrium. These are composed of areas of central necrosis, lymphocytic zones and endothelioid cell formations about the necrotic central portion. Giant cells are also seen. The stroma of the endometrium is densely infiltrated with lymphocytes. A few glands are dilated, but for the most part they are normal. The larger tubercles are well encapsulated with connective tissue. The uterine tubes are practically destroyed by the tuberculous process, excepting near the isthmus, where they remain normal. The ovaries are normal.

Diagnosis.—Advanced generalized miliary tuberculosis with tuberculous metritis and salpingitis. Smears stained for *Bacillus tuberculosis* were positive.

Experimental Inoculation with Bacillus Pyogenes

Space will not permit detailing these experiments. Two attempts to infect heifers with fresh cultures of *Bacillus pyogenes*

met with failure. In one instance, in a pregnant heifer, inoculations into the blood stream were made without result. The calf was delivered normally and subsequent necropsy of the subject revealed normal genitalia. In another case fresh cultures were injected into the cavity of the uterus. No infection resulted, as was shown by necropsy findings. These experiments illustrate the resistance of the normal genital tract to such types of infection and the necessity of a predisposing factor.

Serological Studies with Bacillus Pyogenes

Two rabbits were immunized with separate strains of *Bacillus pyogenes*. Serum from these rabbits agglutinated all strains of the organism to an equal degree. The cultural studies confirm this close relationship of type.

DISCUSSION

It is confusing in interpreting results in Table 1 to have such a large group of streptococci. All strains, excepting *Streptococcus pyogenes* and *Streptococcus anginosus* are of the non-hemolytic (Alpha and Gamma types). These two, however, fall into the group of hemolytic streptococci. (Beta type.)

It will be seen after careful study of the material presented that the organisms most important in infections of the genital tract of the cow are streptococci and *Bacillus pyogenes*. These types are responsible for the greater number of infections. In all cases of severe nonspecific metritis and other suppurative processes about the genitalia *Bacillus pyogenes* combined with streptococci, or the latter alone, have been isolated. Other organisms are not regarded as playing a primary rôle. Unless the bacteriologic study is made during the progress of active infection, these types as well as others will most often not be found. In such cases one views only the results of infection, the active process having subsided. It is for this reason that in nearly all cases when no gross evidence of active inflammation exists the genital tract is sterile. The vagina, cervix uteri and corpus uteri must be excepted.

Organisms are not harbored as commensals normally in the internal genitalia of the cow, with exceptions as already made. Case 6 is an unparalleled example of this. Hydrosalpinx, the end result of active inflammation, existed, cultures from which were sterile. Case 10 also illustrates the point. Many other

TABLE 1.—SUMMARY OF BACTERIOLOGICAL FINDINGS

Genital organ	Case Number																		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Vagina	1 5 14	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Os uteri externum	1 5 14	X	X	X	X	1 2 5	1 10 13	1 2 4	3	0	X	X	Y	Y	11 13	13 15	13 15	1 3 13 15 19	X
Corpus uteri	0	3 5 12 13	0	0	0	1 2 5	X	1 2 4	0	0	1 3 15 17 19	0	Y	Y	11 13	13 15	13 15	1 3 13 15 19	20*
Right cornu uteri	0	3 5 12 13	13	0	13	0	3 10 13	1 2 4	12	3	1 3 15 17 19	0	0	0	X	X	X	X	20*
Left cornu uteri	0	3 5 12 13	0	0	0	0	3 10 13	1 10	0	0	1 3 15 17 19	0	0	0	X	X	X	X	20*
Right uterine tube	0	3 5 12 13	0	0	4 9 13	0	3 10 13	0	0	0	0	0	X	0	X	X	X	X	20*
Left uterine tube	0	3 5 12 13	X	X	0	0	3 10 13	0	0	0	0	0	X	0	X	X	X	X	20*
Right ovary	0	2 12	0	0	0	0	3 10 13	0	0	0	0	0	0	0	X	X	X	X	X
Left ovary	X	0	X	X	0	0	0	0	0	0	0	0	0	0	X	X	X	X	X
Ovarian cysts	0	0	0	0	13	0	0	4	0	0	0	0	0	0	X	X	X	X	X
Ovarian abscess	Y	2 12	Y	Y	13 9	Y	3 10 13	3 10 13	Y	Y	Y	Y	Y	Y	X	X	X	X	X
Periuterine abscess	Y	Y	7 13	4 8 13 16	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	X	X	X	X	X

Explanation of Symbols:

- O, Sterile.
 X, Not cultured.
 Y, Structure not present.
 1, *Staphylococcus aureus*.
 2, *Staph. aurantiacus*.
 3, *Staph. epidermidis*.
 4, *Staph. candidus*.
 5, *Bacillus coli communis*.
 6, *B. coli communior*.
 7, *Streptococcus anginosus*.
 8, *Strep. fecalis*.
 9, *Strep. ignavus*.
 10, *Strep. nonhemolyticus* ii.
 11, *Strep. pyogenes*.
 12, *Strep. mitis*.
 13, *Bacillus pyogenes*.
 14, *B. subtilis*.
 15, *Strep. viridans*.
 16, *Bacillus proteus*.
 17, *Sarcina lutea*.
 18, *Torula rosea*.
 19, *Streptococcus* (Gamma type).
 20, *Bacillus tuberculosis*.
 *, Stain only.

TABLE 2.—SUMMARY OF BACTERIOLOGIC RESULTS INCLUDING ALL CASES

Organism	Times found	Case Number																
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
<i>Streptococcus</i> , Alpha type	8	—	+	—	+	—	—	—	—	+	—	+	—	—	—	—	+	—
<i>Streptococcus</i> , Beta type	2	—	—	+	—	—	—	—	—	—	—	—	—	—	—	+	—	—
<i>Streptococcus</i> , Gamma type	4	—	—	—	—	—	—	+	—	—	+	—	—	—	—	—	—	—
<i>Bacillus pyogenes</i>	9	—	+	+	+	—	—	—	—	—	—	—	—	—	—	+	+	—
<i>Staphylococcus aureus</i>	6	+	—	—	—	—	+	+	+	—	—	+	—	—	—	—	—	—
<i>Staphylococcus</i> , all other types	10	—	+	—	+	+	+	+	+	+	+	—	—	—	—	—	—	—
<i>Bacillus coli</i>	3	+	+	—	—	—	+	—	—	—	—	—	—	—	—	—	—	—
<i>B. tuberculosis</i>	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	+
<i>B. proteus</i>	1	—	—	—	+	—	—	—	—	—	—	—	—	—	—	—	—	—
<i>Sarcina lutea</i>	1	—	—	—	—	—	—	—	—	—	+	—	—	—	—	—	—	—
<i>Tortula rosea</i>	1	—	—	—	—	—	—	—	—	—	+	—	—	—	—	—	—	—

* *Bacillus tuberculosis*, by stain; organs not cultured.

TABLE 3.—SUMMARY OF BACTERIOLOGIC RESULTS IN CASES OF SUPPURATION

Organism	Times found	Case Number																	Per cent present
		2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
<i>Bacillus pyogenes</i>	9	+	+	+	+	+	+	—	—	—	+	+	+	+	+	+	+	+	81.8
<i>Streptococcus</i> , Alpha type	7	+	—	+	+	—	—	—	+	—	—	+	+	+	+	+	+	+	63.6
<i>Streptococcus</i> , Beta type	2	—	+	—	—	—	—	—	—	—	+	—	—	—	—	—	—	—	18.1
<i>Streptococcus</i> , Gamma type	3	—	—	—	—	—	+	+	+	+	+	—	—	—	+	+	+	+	27.2
<i>Staphylococcus aureus</i>	3	—	—	—	—	—	+	+	+	+	+	—	—	—	+	+	+	+	27.2
<i>Staphylococcus</i> , other types	6	+	—	+	+	+	+	+	+	+	—	—	—	—	+	+	+	+	54.5
<i>Bacillus coli</i>	2	+	—	—	—	—	+	—	—	—	—	—	—	—	—	—	—	—	18.1
<i>B. tuberculosis</i> *	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	9.0
<i>B. proteus</i>	1	—	—	+	—	—	—	—	—	—	—	—	—	—	—	—	—	—	9.0

* By stain only; cultures not made.

Case 11, mild puerperal metritis; healing would probably soon have occurred.

Case 18, tuberculous metritis and salpingitis.

examples of a bacteria-free genital tract may be found in the case reports and as compiled in Table 1. The absence of *Bacillus abortus* (Bang) supports the previous view, that it is not found in puerperal infections that persist for any length of time, and that it does not persist, so far as is known, in the genitalia of the cow. *B. abortus* was not isolated from any of the cases studied.

The frequency with which one views degenerative changes in the ovaries of sterile cows can not be disregarded. It seems that in all cases of infection about the genital tract, multiple cystic degeneration of medium-sized Graafian follicles is an almost constant finding. Until more study is made, especially on normal animals as controls, no definite statement can be made. The uterine tubes, because of their many folds and crypts and their delicate structure, offer the most favorable site for persistence of infection. Chronic changes in the genital tract are most frequent in this location and are nearly always seen in the form of hydrosalpinx. In the uterus chronic changes do not readily occur. Only after severe infection over a long period of time are sufficient changes produced to render the organ incapable of serving its natural use. It does not seem as readily susceptible to persistence of infection as do the uterine tubes. The changes noted in the uterus are fibrosis, dilation of glands, atrophy of glandular epithelium, thickening of uterine epithelium, etc. The cervix uteri, like the uterine tubes, offers a favorable site for bacterial reproduction. The folds of the mucosa are deep and in the crypts bacteria may gain entrance and multiply. Although accessible to treatment, the deep crypts allow infection to persist and often to extend to other portions of the genital tract. Hypertrophy of the cervical folds is the most constant chronic change. The vagina, because of its smooth, stratified epithelial surface, is not readily infected. It may harbor pathogenic types of bacteria, as commensals, on its surface, in its accessory glands, in the subepithelial lymph follicles or in the urethral orifice. It is suggested that the vagina and accessory structures are the reservoir for organisms which infect the genital tract of the cow, including *Bacillus abortus* and other types which cause congenital (prenatal) infections. The route of infection may be through the lymphatic system, which is most highly developed about the female genital

tract. The occurrence of parauterine and periuterine infections seems to support this view.

A total of nineteen cases have been studied and presented. The theory of infection does not explain all cases of sterility. Where no evidence of infection, past or present, exists, and the animal is sterile, the ovaries must be looked to as often the cause of the condition.

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STUDIES OF BIOLOGICAL PREPARATIONS BY COMPLEMENT-FIXATION METHODS

I. MALLEIN: ANTIGENIC VARIATIONS AND A PROPOSED METHOD OF STANDARDIZATION ¹

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THE constantly increasing manufacture and sale of biological products, the various and often extravagant and unsustained claims that are made for their potency, superpotency and "careful standardization" (?), the divergent or conflicting testimony and opinions with regard to the employment and values of many of these products, all seem to emphasize the need of State or Government control and more satisfactory and accurate methods of fixing standards of potency.

We believe that these standards can best be fixed and expressed in terms of units of antigen or antibody, and that complement-fixation reactions obtained with a specific antiserum for the biological product under consideration offer a satisfactory method of standardization, more scientific, more uniform and more precise than any of the methods hitherto employed.

Present methods of standardizing tuberculin are based on Koch's discovery of the reaction of tuberculous animals to an injection of tuberculin. A series of guinea-pigs is used for the standardization tests. There are many drawbacks, however, to this method, with which all who practice it are familiar; such as, for example, the time and labor involved, the varying degree of sensitization, individual susceptibility and resistance, and the large number of animals required. The final reckoning, moreover, does not permit of an exact determination of the activity of the product.

As regards suspensions of living or dead bacteria, their potency, standardization and dosage seem to be based largely upon the bacterial count. Great stress is laid upon a "high bacterial count" in respect to many vaccines and bacterins put

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on the market, as if that were the main indicator of their potency and antigenic value.

The virulence, purity and age of the cultures, the composition of the media on which they are grown, the methods and agents used in attenuating or killing them, and the action of preservatives are factors of premier importance. In short, every manipulation and step in preparation is apt to influence strongly the properties of the completed product.

One suspension of relatively few organisms may, according to the manner of preparation, have very high antigenic properties, while another with ten, twenty or even a hundred times the number of bacteria present in it, but prepared and treated in a different manner, may possess an infinitesimal amount of specific antigen.

Discrepancies as regards the determination of antigenic values are common to all products, irrespective of the method used for standardization, whether it be by the weight or count of the bacteria, the opacity test, or by the use of the nephelometer. The true antigenic properties of any preparation must be those present in the finished product and determined by specific immunity reactions.

We have begun our researches on mallein, mainly for the reason that no uniform satisfactory method for the standardization of this product has been evolved. The activity of an untried mallein may be indicated by injecting a glandered horse with a diagnostic dose. But it is dangerous and undesirable to maintain glandered horses for such a purpose. Tests on small laboratory animals are of little and questionable value. Nocard (1)¹ found that 1 c.c. of crude mallein was sufficient to kill a rabbit. We have been unable to kill rabbits with the same and double the dose mentioned with both crude mallein and its equivalent in diluted mallein. Hutyra and Marek (2) say:

Experimentally infected guinea-pigs react both locally and generally to injections of 0.2 to 0.5 gm., while the injection of 2.0 gm. into healthy guinea-pigs produces only temporary elevation of temperature. (Pearson.)

The effectiveness of mallein varies according to the virulence of the strain of bacilli as well as to the method according to which it has been prepared. At present we have no reliable methods of standardizing this material aside from its practical application in testing glandered horses.

¹ Numerals in parentheses after authors' names refer to list of literature at end of paper.

The only attempt, so far as we have been able to ascertain, to standardize mallein in vitro was made by Fava (3). Comparing the activity of various malleins by the precipitin test and by the intracerebral injection in guinea-pigs, he found that the precipitin test was much more delicate for estimating the activity of mallein.

We have employed precipitin tests in our preliminary experiments and found the method unsatisfactory for comparative titrations. Much difficulty is frequently experienced in reading the reactions, which, with the wide allowance that must be made for individual interpretation, has led us to discard this procedure and to employ the less arbitrary, if more arduous, complement-fixation test, following Watson's modification (4). The complement-fixation test is generally accepted as a very reliable diagnostic test for glanders; in fact, it may be said to be the most accurate test known in this respect; but as it is entirely a laboratory test, it has not superseded the mallein field test, but is used as an auxiliary to it, especially in connection with a questionable mallein reaction.

In employing the complement-fixation test, however, it was very soon recognized that there was a possible source of error in that horses previously injected with mallein are prone to give positive reactions (fixation). In other words, horses could be sensitized to mallein, the sera of such horses containing specific antibodies which would react to mallein or other glanders antigens when brought together in proper combination. This phenomenon has been much studied, and in accordance with the experiments and observations of different workers, varying periods of time have been mentioned for the appearance and disappearance of these antibodies in the blood sera of horses and for the interval between malleination and a serum test.¹

With these facts in mind we set to work to hyperimmunize a horse to mallein with the object of obtaining an antiserum which could be utilized for an exact method of titration, and thereby the standardization, of mallein or the products of *Bacillus mallei*.

¹ Author's note on going to press: A paper by Brocq-Rousseau, P. Forgeot and A. Urbain, "Sur la formation des anticorps à la suite des injections de malléine" (Ann. Inst. Past., vol. 35, Dec., 1921), has just come to hand. The formation, duration and richness of antibodies in malleined horses is shown by experiments. Forty-five days is given as the necessary interval between malleination and a complement-fixation test.

ANTIMALLEIN SERUM

The mallein used for immunization is the product of the Biological Laboratory, Ottawa, and from the same stock that is distributed to veterinarians for the diagnosis of glanders in horses. A normal horse received subcutaneous injections of this mallein at intervals of from seven to fourteen days, commencing June 10, 1921. After four injections of 2.5, 5, 7.5 and 10 c.c. respectively, spread over a period of four weeks, a serum was obtained which in a dose of 0.1 c.c. fixed one unit of complement in the presence of 0.1 c.c. of dilute mallein.

Continuing immunization with increasing doses of mallein, serum obtained after the fifth injection of a 12.5 c.c. dose, and again seven days after the sixth injection of a 15 c.c. dose, gave likewise fixation in a dose of 0.1 c.c. After the seventh injection of a 17.5 c.c. dose, an interval of sixty days elapsed without further injections. A serum test at this time showed a marked reduction in antibody content. A further injection, the eighth, of 20 c.c. mallein was given. Nine days later the complement-fixing unit of the antimallein serum was raised to 0.04 c.c.—that is, 25 units per cubic centimeter. A final injection, the ninth, of 20 c.c. mallein, was given after forty days. This raised the titer of the serum to 0.01 c.c. (100 units per cubic centimeter). This titer of the antiserum was maintained without further injections of mallein for twenty-seven days, when it gradually declined from 0.01 c.c. (100 units) to 0.06 c.c. (16.6 units) on the fifty-third day, continuing without further reduction to the ninety-third day, after which a further gradual decline was registered, namely, 0.08 c.c. (12.5 units) on the 107th day, 0.1 c.c. (10 units) on the 119th day, 0.13 (7.7 units) on the 127th day and 0.14 (7.1 units) on the 147th day. (See accompanying diagram.)

ELIMINATING NONSPECIFIC FIXATION

As soon as a serum that would fix complement in the presence of mallein was obtained, the question of specificity presented itself. Since the media on which *Bacillus mallei* is cultivated contain a variety of proteins, there was a possibility of these acting as antigens instead of, or in addition to, the specific product of the organism. We found, however, that glycerin-bouillon, identical with the culture medium in which *B. mallei* is grown for the production of mallein in our laboratory, did

not cause any fixation of complement when used as antigen in the same and double the amounts of mallein antigen, nor with a double dose (0.2 c.c.) of the antimallein serum.

Other biological products such as tuberculin and blackleg filtrate were also employed as antigens, but caused no fixation of the complement. Although there may be some bacteria or bacterial product with antigenic properties similar to those of mallein and capable of combining with antimallein horse serum to fix complement, we have not encountered it thus far in our studies. Moreover, our main object was to eliminate only non-specific fixation that might have been caused by the presence in the culture medium of constituents other than the specific products of the *B. mallei*.

Apropos of nonspecific fixation, we observed a curious fixation phenomenon with the sera of normal rabbits. Among the animals immunized for the production of antimallein serum were two rabbits. Serum collected from one of them after five inoculations fixed in a 0.1 c.c. dose, one unit of complement in the presence of 0.1 c.c. of mallein. The serum of the normal rabbit control likewise fixed complement in the same amount. A repetition of the test gave the same results.

To clear up the matter we collected sera from six healthy rabbits. The rabbits were chosen at random from our pens and bled from the ear. The blood was defibrinated and centrifuged and the clear serum was inactivated at 58–60° C. for half an hour. All these sera fixed one unit of complement in amounts of 0.1 c.c., in degrees varying from one plus to four pluses, when mallein and tuberculin were used as antigens in quantities of 0.1 c.c. Using ordinary glycerin-bouillon as a control antigen in the same amounts, the fixation reactions were weakened, and with one serum there was no fixation at all. Table 1 shows the comparative degrees of fixation obtained with mallein, tuberculin and glycerin broth as antigens.

In all of our complement-fixation tests we have used the "rabbit antisheep" hemolytic system. As natural hemolytic amboceptors for sheep cells are present in normal rabbit serum, it might be thought that the addition of rabbit serum (as the test serum) would favor hemolysis. In practice, however, the opposite reaction seems to take place, complement being deviated and hemolysis correspondingly inhibited.

It would appear that when both the test serum and the hemo-

TABLE. 1—NONSPECIFIC FIXATION REACTIONS WITH RABBIT SERA AND DIFFERENT ANTIGENS

Serum		Antigens		Controls		
Rabbit No.		Mallein	Tuberculin	Glycerin-bouillon	Antigen	Serum
First test 1 2	Antimallein.....	++++	.....	.....	-	-
	Normal.....	++++	.....	.....	-	-
Second test 3 4	Antimallein.....	++++	++++	.....	-	-
	Antituberculin.....	++++	++++	.....	-	-
Third test 5 6 7 8 9 10	Normal.....	++++	++++	++++	-	-
	Do.	+++	+++	+	-	-
	Do.	++++	++++	+++	-	-
	Do.	+	++	-	-	-
	Do.	++++	++++	+++	-	-
	Do.	+++	+++	+	-	-

In the foregoing table and elsewhere in this paper we have indicated the range of reactions between complete hemolysis and complete fixation by the six signs, -, +-, +, ++, +++, +++++.

lytic serum are derived from rabbits a precipitin reaction comes into play and causes deviation or absorption of complement to a greater or less degree. In fixation tests of rabbit serum the "rabbit antishoop" hemolytic system should therefore not be used, and in all complement-fixation tests it is desirable that the three animal species represented by the complement, red cells and sensitizing serum of the hemolytic system should not include the animal species represented by the test serum.

Kolmer and Trist (6) have studied nonspecific fixation by normal rabbit serum and conclude by saying: "It is to be emphasized that when rabbits are employed for experimental studies with a view to using their sera for complement-fixation tests, their sera should be tested one or more times, before inoculation, preferably with the particular antigen to be used, and only those selected that react negatively."

THE UNIT SYSTEM

If the value or strength of antisera and antigens can be determined in vitro by laboratory tests and indicated in terms of units, it follows that comparisons, valuations and the fixing of standards become much simplified and easily read.

Calmette and Massol (5) employed a unit system in which one unit of antiserum was represented by the minimum dose of complement required in their particular hemolytic system.

The number of such minimum doses of complement deviated by 1.0 c.c. of antiserum plus antigen represents the unit value of the antiserum. The determination is made in a series of tests using fixed amounts of antiserum and increasing amounts of complement. The maximum amount of deviated complement divided by the minimum dose gives the number of units.

Our own unit system is one in which one unit of antiserum is represented by the minimum dose of that serum which can completely fix one minimum dose of complement required in our hemolytic system, the determination being made by using only one exact unit of complement (the minimum dose) with decreasing amounts of antiserum plus the antigen. It necessarily follows that the accurate titration of the complement (†) is most important and essential, a point which can not be emphasized too much. The diagram shows the minimum dose,

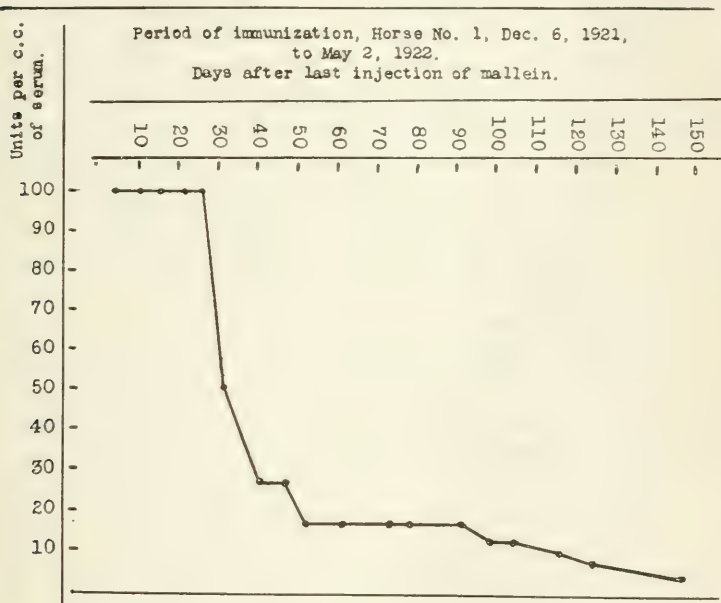


Diagram showing duration of sensitization to mallein.

or one unit (and the computed number of units per cubic centimeter) of antiserum fixing one unit of complement in the presence of 0.1 c.c. of mallein. Eighteen series of tests were made with the 18 different samples of serum obtained from this immunized horse during a period of 147 days following the last

injection of mallein. During this period the number of units per cubic centimeter of serum dropped from 100 to 7.

Dose of mallein for titrating an antiserum.—The amount of mallein used in the titration of our antiserum was always a fixed dose and equal to one-half of the maximum dose which with the antiserum caused complete fixation of complement and with a negative or normal serum did not cause any inhibition of hemolysis or deviation of complement. This one-half maximum dose of mallein assures the necessary excess or margin of antigen and at the same time eliminates nonspecific inhibitory action.

Dose of antiserum for titrating a mallein.—After titrating the antimallein serum and arriving at a unit, our next step was to discover the most suitable number of antiserum units to employ for determining the antigenic unit of mallein. In this work, a serum titrating at 0.01 c.c. was used, in two units (0.02 c.c. of serum), five units (0.05 c.c. of serum), ten units (0.1 c.c. of serum) and twenty-five units (2.5 c.c. of serum). As antigen our own subcutaneous mallein, in dilutions of from 1:100 to 1:600, was employed. The best gradation resulted in the row employing ten units of antiserum. The row in which five units were used is not quite so good, while that with two units gave only a three plus reaction in the first tube. On the other hand the row using twenty-five units, although no inhibition was evident in the serum control tube, has no advantage over the five-unit row.

We have not made enough observations on this point to lay down definitely a hard and fast rule for the number of antiserum units that must always be used in the titration of the antigen unit, since it could not be applied to an antiserum of low titer; for instance, one titrating out at 0.08 c.c., as it is obvious that ten units of such a serum would be far in excess, by volume, of the amount that could safely be used without causing inhibition. However, as an antiserum of high titer can be obtained without much difficulty, ten units should never amount to more than 0.2 c.c. by volume of antiserum.

To repeat and to make clear our system of titration for determining the reactivity of an antiserum and an antigen and for computing the number (N) of units in a given volume (V) of either reagent, the minimum amount (M) of the one which, in the presence of an excess but noninhibitory amount of the

TABLE 2.—COMPARATIVE REACTIONS OF DIFFERENT MALLEINS (ANTIGENS) WITH ANTIMALLEIN HORSE SERUM

Dose of antigen (mallein)	Mallein samples (as prepared for subcutaneous injection)							Ophthalmic mallein discs		
	A	B	C	D	E	F	G	X	Y	Z
cc. 0.02	++++++ (1 of 1:50)	++++++ (1 of 1:50)	++++ (1 of 1:100)	++ (1 of 1:100)	++++++ (1 of 1:50)	++++++ (1 of 1:50)	++++++ (1 of 1:50)	++++++ (1 of 1:50)	++++ (1 of 1:100)	++++++ (1 of 1:50)
0.01	++++++ (1 of 1:100)	++++++ (1 of 1:100)	++++ (1 of 1:150)	++ (1 of 1:150)	++++++ (1 of 1:100)	++++++ (1 of 1:100)	++++++ (1 of 1:100)	++++++ (1 of 1:100)	++++ (1 of 1:100)	++++++ (1 of 1:100)
0.0066	++++++ (1 of 1:200)	++++++ (1 of 1:200)	++++ (1 of 1:250)	++ (1 of 1:250)	++++++ (1 of 1:200)	++++++ (1 of 1:200)	++++++ (1 of 1:200)	++++++ (1 of 1:200)	++++ (1 of 1:200)	++++++ (1 of 1:200)
0.005	++++++ (1 of 1:250)	++++++ (1 of 1:250)	++++ (1 of 1:300)	++ (1 of 1:300)	++++++ (1 of 1:250)	++++++ (1 of 1:250)	++++++ (1 of 1:250)	++++++ (1 of 1:250)	++++ (1 of 1:250)	++++++ (1 of 1:250)
0.004	++++++ (1 of 1:300)	++++++ (1 of 1:300)	++++ (1 of 1:350)	++ (1 of 1:350)	++++++ (1 of 1:300)	++++++ (1 of 1:300)	++++++ (1 of 1:300)	++++++ (1 of 1:300)	++++ (1 of 1:300)	++++++ (1 of 1:300)
0.0033	++++++ (1 of 1:350)	++++++ (1 of 1:350)	++++ (1 of 1:400)	++ (1 of 1:400)	++++++ (1 of 1:350)	++++++ (1 of 1:350)	++++++ (1 of 1:350)	++++++ (1 of 1:350)	++++ (1 of 1:350)	++++++ (1 of 1:350)
0.0028	++++++ (1 of 1:400)	++++++ (1 of 1:400)	++++ (1 of 1:450)	++ (1 of 1:450)	++++++ (1 of 1:400)	++++++ (1 of 1:400)	++++++ (1 of 1:400)	++++++ (1 of 1:400)	++++ (1 of 1:400)	++++++ (1 of 1:400)
0.0025	++++++ (1 of 1:450)	++++++ (1 of 1:450)	++++ (1 of 1:500)	++ (1 of 1:500)	++++++ (1 of 1:450)	++++++ (1 of 1:450)	++++++ (1 of 1:450)	++++++ (1 of 1:450)	++++ (1 of 1:450)	++++++ (1 of 1:450)
0.0022	++++++ (1 of 1:500)	++++++ (1 of 1:500)	++++ (1 of 1:500)	++ (1 of 1:500)	++++++ (1 of 1:500)	++++++ (1 of 1:500)	++++++ (1 of 1:500)	++++++ (1 of 1:500)	++++ (1 of 1:500)	++++++ (1 of 1:500)
0.002	++++++ (1 of 1:500)	++++++ (1 of 1:500)	++++ (1 of 1:500)	++ (1 of 1:500)	++++++ (1 of 1:500)	++++++ (1 of 1:500)	++++++ (1 of 1:500)	++++++ (1 of 1:500)	++++ (1 of 1:500)	++++++ (1 of 1:500)

¹ In all of these titrations the antiserum was employed in a fixed dose of 0.1 cc., representing 10 units of antiserum (titer 0.01).

other, will fix one unit of complement is said to be a single, active unit. The amount of a given volume of reagent divided by the amount represented in a single unit will give the total number of units ($\frac{V}{M} = N$).

Ex.: The diagnostic dose of a certain mallein is given as 2.5 c.c. The antigenic unit of this mallein is determined as 0.0033 c.c.

$$\frac{V \text{ (diagnostic dose) } 2.5}{M \text{ (antigenic unit) } 0.0033} = 757$$
 units in one diagnostic dose.

THE REACTIVITY OF DIFFERENT MALLEINS AS REPRESENTED IN UNITS OF ANTIGENS

Determinations of the units of antigen in a diagnostic dose of mallein have been made with seven samples of liquid mallein and with three samples of ophthalmic mallein discs. Two of the former, designated A and B, were products of our Biological Laboratory. The remainder, C, D, E, F, G, X, Y, Z, were all of different origin and obtained from foreign houses. Mallein A was used for the production of our antimallein serum.

The reactions are detailed in Table 2 and the determinations summarized in Table 3.

It may be noted that sample E, a foreign mallein, reacts more strongly than our own product A. This fact should eliminate a possible suspicion

TABLE 3.—SUMMARY OF COMPARISON OF MALLEINS

Sample ¹	One unit	Diagnostic dose recommended by the makers	Total number of units (approximate)
Liquid mallein A (our own)	0.0033	2.5 c.c.	750
Liquid mallein B (our own)	0.002	2.5 c.c.	1,250
Liquid mallein C (foreign)	0.0066	4.0 c.c.	600
Liquid mallein D (foreign)	0.01	2.0 c.c.	200
Liquid mallein E (foreign)	0.002	2.5 c.c.	1,250
Liquid mallein F (foreign)	nil.	1.0 c.c.	nil ²
Liquid mallein G (foreign)	0.002	1.0 c.c.	500
Ophthalmic mallein ² X (foreign)	0.005	one disc	200
Ophthalmic mallein ² Y (foreign)	0.02	Do.	50
Ophthalmic mallein ² Z (foreign)	0.002	Do.	500

¹ Samples C and X are made by one maker, D and Y by another, and G and Z by a third.

² Apparently quite inactive.

that the antimallein serum used is more specific for our own mallein than for foreign malleins.

We have not checked the determinations shown in Table 3 with diagnostic tests on glandered horses, and therefore have not fixed a standard number of units for a diagnostic dose. It is plain, however, that samples D and Y fall far below what may be considered an average standard, while sample F appears to be quite inert.

Frozen mallein.—Mallein will readily freeze when exposed to severe cold, a contingency not unlikely during winter transit or storage. We have studied the effect of freezing in regard to antigenic value. A 10 c.c. bottle of our own mallein was well shaken and half its contents transferred to another bottle. This was put out of doors and frozen for thirty-six hours, during which time it thawed once, owing to a rise in temperature. Just before use the frozen sample was thawed at room temperature, mixed in dilutions and titrated. Comparing the results with the unfrozen sample titrated at the same time with identical reagents, no difference could be detected in the final results. One may therefore conclude that freezing has no effect on the antigenic value of mallein.

The foregoing experiments show that there is a marked antigenic variation in different samples of manufactured malleins. The number of units of antigen in each prescribed diagnostic dose of these different makes varies between 1,250 and zero.

Methods of titration, differing in the procedure followed by us but based on the same principles of the complement-fixation test, may give different results in respect to the total number of antigen units in a given volume of mallein, but the ratio would not be changed.

Working on similar lines in respect to the reactivity of tuberculins and certain vaccines, and without going into the details which will be given in subsequent papers of this series, we have found significant ranges of antigenic variations. Assuming that the efficacy of a biological product as a diagnostic, therapeutic or prophylactic agent is dependent upon and related to its antigenic value, we believe that the standardization of such products by complement fixation methods will give an assurance as to potency and dosage which at present is lacking or unwarranted. It would then be possible to substitute for the present crude system of dosage by volume or weight of products of varying and certain strength the more intelligent system of dosage by units of antigen.

SUMMARY AND CONCLUSIONS

The criteria commonly adopted for denoting the strength and activity of many biological preparations, so widely exploited for the diagnosis, treatment and prevention of animal diseases, are, for the most part, crude and unsatisfactory, and in some cases worthless.

The strength and activity of malleins, tuberculins, sera and vaccines or bacterins can best be expressed in terms of units of antigen and units of antibody.

The horse is easily sensitized to mallein and will furnish an antimallein or sensitizing serum of high titer. The immunity is not lasting and begins to fall, as shown by a gradual diminution in the number of antibody units, in about thirty days after the last injection of mallein. The immunity can be restored by further injections of mallein.

Rabbits have been found unsuitable for the production of a specific antiserum for complement-fixation tests in which a rabbit-antisheep hemolytic system is employed; that is to say, the antiserum (test serum) and the hemolytic serum should not both be obtained from the same species of animal.

Antimallein horse serum binds or deviates complement in the presence of mallein. It gives no reaction with tuberculin, blackleg filtrate, glycerin-bouillon and other culture media. The reaction is therefore specific for mallein.

The antigenic value of mallein can be ascertained by titrating the product with a predetermined, fixed dose of antimallein serum in complement-fixation tests.

The reactivity of malleins of different origin and manufacture show a wide and significant range of variation.

Alternate freezing and thawing does not reduce the antigenic value or change the reactivity of mallein.

Complement fixation permits of a relatively true estimate of the antigenic properties of bacteria and of their specific products and offers a satisfactory method of standardization.

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The many friends and colleagues of Dr. J. G. Rutherford, C. M. G., Commissioner of the Canadian Railway Board, will be interested to learn that he has been recently advised of his election as "Membre Correspondant" of the "Société Centrale de Médecine Vétérinaire de France."

This election took place at the annual meeting of the Society on May 4, 1922.

Our English contemporary *The Veterinary Journal* has organized two interesting tours for veterinarians, one of seven days to Belgium, including the fine Government Veterinary School and the battlefields, at a cost of about \$45, and the other of three weeks to Italy, taking in the International Congress of Comparative Pathology at Rome in September, at a cost of about \$180. If similar tours could be made from America at any such low rates it is safe to say that they would be largely patronized.

Dr. J. A. Allen addressed a meeting of the local branch of the same association in Charlottetown, P. E. I., April 29, outlining the work and functions of the Fox Research Station of the Canadian Government.

ANTISERA, AGGRESSINS AND PROPHYLAXIS, WITH A NOTE ON ROUP IN BIRDS¹

By J. G. JACKLEY

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IN VIEWING the political history of the world one is forcibly impressed with the fact that "history repeats itself," that after every violent advance there is a violent reaction. After the excesses of the French Revolution the people welcomed the iron-handed dictator Napoleon, and after the rule of the Puritans the English people flew back with joy to their kings. It is, then, but natural that medical history should also run to extremes. If we look back over the progress made in medical science we observe that there have come at intervals furors of hope for the "cure-all"—the high tide of popularity of this remedy or that method of treatment. Each in turn has enjoyed its high position for a short period and then has been forgotten or succeeded by some newer idea which gained the point of vantage on the stage.

With the discovery of the relationship of bacteria and protozoa to disease in the latter part of the nineteenth century there ensued an era of unprecedented advancement. As new microorganisms were identified, new curative sera or prophylactic methods were devised. Bacterin therapy, serum therapy and chemotherapy became the supreme methods where heroic measures were sought. With these therapeutic measures went hand in hand the antiseptics, disinfectants and sanitary measures for the control and eradication of disease. So popular did these specific methods become that many practitioners almost completely lost the art of drug therapy and in many cases forgot or discarded the usual sanitary precautions required in the control of infectious diseases.

For some time, however, a violent reaction has been developing. In certain cases normal horse serum has been substituted for immune sera, with seemingly as good results. There are many who believe now that no results are possible from the

¹Presented at the annual meeting of the California State Veterinary Medical Association, Los Angeles, June 6, 1922.

use of tetanus antiserum in horses; others are becoming skeptical as to the sole relationship of the tubercle bacillus to this disease, while others have been trying to create new diseases when acid-fast organisms corresponding to this group have been found localized in parts not customarily infected. Still others have come to the conclusion that the bacillus of Bang is not the primary cause of abortion in cattle because little progress is being made toward the development of a specific curative product. Others have questioned the relationship of the group of streptococci and bipolar organisms to specific diseases since these organisms are apparently ubiquitous in nature and are quite generally found upon the healthy mucous membranes of the respiratory tract. So the list might be extended.

It is not my purpose to attempt to substantiate or refute these claims. I merely refer to them to demonstrate the strong reaction that is following the advance made by serum therapy—and the end is not yet; the reaction has not yet reached its crisis.

Just now the faulty diet, deficiency disease and malnutrition are in the foreground. Since the classic feeding experiments with polished rice and other deficient foodstuffs there have appeared those who believe a solution of all remaining problems in medicine to be here at hand.

No one, I dare say, will doubt that there are deficiency diseases of dietary origin, notably xerophthalmia, scurvy and beriberi. On the other hand, pellagra, rickets and several other diseases are not yet so proved. Bacterial infections probably play an important rôle. At any rate evidence is by no means completely in favor of the unbalanced nitrogenous diet or avitaminoses as having the importance formerly thought.

Much progress has been made in clearing certain moot points regarding deficiency diseases, but one should guard against too hasty or too optimistic conclusions. Only recently the United States Public Health service reported that efforts during the year to discover the unidentified food substance whose absence from the diet predisposes to pellagra have excluded two of the three known vitamins, and a note of warning is sounded against the popular tendency to extol vitamins as a cure-all.

During the last twenty years the subject of filterable viruses has been much discussed. Whenever a disease did not readily respond to the usual methods of investigation an easy way out

was always the filterable virus. We can now look back and enumerate several diseases so considered at one time but now known to be due to specific organisms. The food poisonings, intoxications, ptomains and forage poisonings are examples of infections due to organisms long known but overlooked because considered saprophytic.

I hope that I do not merit the appellation of "alarmist," but I do believe that the present trend and condition justify some serious thought. Undoubtedly the best balanced individual will prefer to be conservative, to fly neither from the one nor to the other extreme.

Bacterins, vaccines and antisera are still excellent tools in the hands of the experienced workman, but he must remember that these products have their limitations. But when rightly used at the right time and in conjunction with all other available means, such as proper sanitary precautions, good nursing and proper food, they serve an excellent purpose.

It is probably true that in the past too little thought has been given the subject of proper foods. In veterinary medicine as in human medicine the fallacy has been that it was assumed that any diet that contained protein and carbohydrates with a certain amount of fats and salts must of necessity be above criticism. Such a diet, however, may utterly fail to support satisfactory nutrition.

Proper amounts of the protective foods, the leafy vegetables and plants, together with milk and eggs, must be consumed, but with these must go the requisite proportion of proteins, minerals and energy foods. The proteins may be derived from grains or seeds, but should preferably come from several sources, in order that if one is lacking in any necessary amino acid this lack may be compensated for by some other protein containing the missing element. It seems logical, in the light of more recent investigations, to conclude that improper nutrition predisposes to infection, rather than that malnutrition itself is the sole factor involved in many so-called distinct disease entities.

This brings me to the consideration of a concrete example that I should like to present. Several years ago the writer published a memoir on "The Etiology of Roup in Birds,"¹ in which it

¹ Kans. State Agr. Col., Tech. Bul. 4., 1917.

was stated that the causative factor of this disease was apparently a bacterium belonging to the pasteurella group. The organism can always be recognized in cases of the disease in smears made directly from the lesions; it has been isolated and grown upon artificial media, and finally, the disease has been reproduced with pure cultures and a high degree of protection has been demonstrated against the natural disease after immunization with pure cultures of this organism.

This disease has been the cause of a great deal of controversy. There is yet much confusion as to whether roup, as typically represented by the swollen eye and head, is merely another form or manifestation of chicken pox or whether these are separate and distinct diseases. This latter point is of minor importance, however, so far as the problem of roup is concerned. It seems not unlikely that they may be caused by different etiological factors, yet this may not be the case. The vital point in the present discussion of roup is its cause.

Numerous investigators have studied the disease and numerous causes have been brought forward. The causes run from a filterable virus to several species of bacteria, and more recently a disease indistinguishable from roup has been attributed to malnutrition. In fairness to all, the question as to primary etiology continues to be an open one, but the fact still remains that in all the different stages of this disease we find predominating a bipolar staining organism that culturally and biochemically corresponds exactly to the pasteurella group.

Assume for the sake of argument that the true primary cause is a filterable virus or malnutrition or some other unknown organism, and not this member of the pasteurella group. If we can control this pasteurellosis and can thus prevent the complications that this organism undoubtedly is responsible for, it must be conceded that we have accomplished a good deal. On the other hand, because this organism can not be distinguished from *Bacterium avisepticus* or the other members of the group does not argue against its specificity, but rather supports the contention that under certain circumstances these organisms may live a saprophytic existence or they may invade the animal body and become parasitic. We know that the aggressive forces of the bipolar organisms may easily be completely lost when grown upon artificial media, and it would therefore seem logical to believe that the converse might also

hold true. When the organisms have invaded the living body they may localize themselves and assume a half parasitic rôle, causing chronic conditions such as are described for roup, or they may become true parasites and cause the acute forms of septicemia.

The relationship of the *pasteurella* group to this disease is based largely on the fact that repeated injections of a killed suspension of the organism, isolated from the eye lesions, does confer a decided protective influence against the natural virus of roup. While some investigators have reported failure to secure appreciable immunity in animals after the use of the various hemorrhagic septicemia bacterins on the market, it must be remembered, in the disease roup and probably in other infectious diseases, that the balance between the aggressivity of the microorganisms and the resistance of the macroorganism is probably very nearly equal. In many cases probably this balance is so nearly equal that but slight assistance to the host under field conditions will suffice to tide it safely over a possible danger period.

As a result of more recent work done, the conclusion has been arrived at that curative or prophylactic methods in this disease, as in others, must depend upon the combined use of all measures at our disposal. These methods are:

1. Prophylactic vaccination.
2. Thorough disinfection of buildings and grounds.
3. Properly balanced ration containing digestible proteins, energy foods and protective nutrients proportionately combined.
4. Isolation of infected animals, together with such treatment as the case indicates.

In conclusion I should like to emphasize that it is not the intention of the writer to underestimate the importance of the filterable virus, nutritional defects or other factors, but rather to call attention to the need of unbiased and impartial action in the treatment and control of disease.

At the recent commencement exercises at Central High School, Washington, D. C., each of the following veterinarians had a son or daughter among the graduates: D. E. Buckingham, H. K. Walter, W. F. Davis, and J. R. Mohler.

NORMAL TEMPERATURE OF THE ADULT DOMESTIC FOWL

By B. F. KAUFF

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HISTORICAL REVIEW

THE SUBJECT of the temperature of the domestic fowl in health is of undeniable importance, especially just at the present time on account of the attention paid to it by poultry specialists and veterinarians in the diagnosis of certain diseases of fowls. Observers have not put on record very many or lengthy articles on this subject. There is a gap in poultry literature upon this particular point, and it is with the desire to fill a small portion of this gap that the observations are given below.

Temperatures of the fowl are taken by inserting the thermometer in the cloaca. The normal temperature of the fowl is given by Colon (1)¹ as 108° F., while R. Mead Smith (2) and Wesley Mills give it as 107.6° F. Major Frederick Hobday (3) gave an average of 106.9° F., and a fair range to take when considering fowls at roost and at liberty appears to be between 105.5 and 108.5° F. The temperatures of 12 fowls, which had been at rest one hour, registered an average of 106° F., the temperature of the fowl-house being 39° F. The highest temperature was 107, the lowest 105.1. The temperatures of 18 fowls taken immediately after going to roost registered an average of 106.5° F.; the highest was 107.1, the lowest 105.6. The temperature of 26 fowls taken an hour and a half after going to roost averaged 106.8; the highest was 108.5, the lowest 105.6. The temperatures of 20 fowls taken an hour and a half after going to roost averaged 106.8, the highest being 108.5, the lowest 105.6. The temperatures of 16 fowls taken after having been at rest four or five hours gave an average of 106, the highest being 107.1 and the lowest 105. The fowl-house was 70° F. The average temperature of six fowls taken while at liberty, somewhat troublesome to catch, was 107.8, the highest

¹ Numerals after authors' names refer to list of literature at end of paper.

temperature being 109.2 and the lowest 107.8. The average temperature of 13 fowls taken while at liberty was 108.2, the highest temperature being 109.4, the lowest 107.2.

The average temperature of the duck is given by Cohn at 107.8° F. The average temperature of 24 ducks, taken when fastened up at night and also when at liberty, averaged 107.8; the highest was 109.4, the lowest 106.6. One very excited bird registered 111. The duck appears to have a temperature slightly higher than that of the fowl.

Major Hobday recognizes the fact that the temperature of the external atmosphere certainly plays some part. In hot, close weather the body temperature is slightly higher than in cold weather, and the rise caused by exercise is much more marked.

The writer (4) in 1917 made a summary of the temperatures of 48 fowls. The average temperature was 106.6° F. The breeds of fowls included Barred Plymouth Rock hens 2½ years old; Columbian and Golden Wyandotte hens 2½ years old; Single Comb Rhode Island Red pullets 8 months old; Single Comb White Leghorn hens 1½ years old, pullets 8 months old, and one cock 1½ years old; White Faced Black Spanish hens 2½ years old; Silver Campine cockerel 8 months old; Mottled Houdan hen 2½ years old, and a Buff Orpington hen 2½ years old; thus taking in both males and females, young and old, and different breeds.

In later work (5) it was observed that the temperature of the fowl was markedly influenced by the surrounding atmospheric temperature. During the year extending from November, 1918, to October, 1919, inclusive, the temperatures of 46 Single Comb White Leghorn hens were taken on the first day of each month with the following results:

TABLE 1.—TEMPERATURES OF BIRDS AS AFFECTED BY THE ATMOSPHERIC TEMPERATURE DURING THE YEAR.

Month	Year	Hour of taking	Atmospheric temperature	Average temperature of 46 Leghorn hens
			° F.	° F.
November.....	1918	11 a.m.	57	108.2
December.....	1918	11 a.m.	47	107.6
January.....	1919	11 a.m.	67	107.7
February.....	1919	11 a.m.	49	107.6
March.....	1919	11 a.m.	64	107.9
April.....	1919	11 a.m.	49	107.1
May.....	1919	11 a.m.	67	107.5
June.....	1919	11 a.m.	94	109.2
July.....	1919	11 a.m.	82	108.1
August.....	1919	11 a.m.	88	108.1
September.....	1919	11 a.m.	77	107.8
October.....	1919	11 a.m.	86	108.0

From this summary table the average temperature for 46 Single Comb White Leghorn hens, taken between the hours of 11 a. m. and 12 m. the first day of each month, was 107.7. It is further seen that the mass effect of temperature fluctuates to some degree with the atmospheric temperature surrounding the hen at the time of taking the temperature. On the days on which the atmospheric temperature ranged from 47 to 49, the average temperatures of the hens were from 107.1 to 107.6. On the days when the atmospheric temperature ranged from 57 to 77 the temperatures of the hens ranged from 107.5 to 108.2, and on the days when the atmospheric temperature ranged from 82 to 94 the lowest temperature of the hens averaged from 107.2 to 109.2. The range of temperature and average temperatures are tabulated in Table 2.

TABLE 2.—AVERAGE TEMPERATURES OF FORTY-SIX SINGLE COMB WHITE LEGHORN HENS IN DIFFERENT ATMOSPHERIC TEMPERATURES.

Range of atmospheric temperature	Range of temperatures of hens	Average temperatures
° F. 47-49	° F. 107.1-107.6	° F. 107.3
57-77	107.5-108.2	107.8
82-94	107.2-109.2	108.2

In a study of Table 1 it is of interest to note that on June 1 the atmospheric temperature was 94° F. The temperatures of the hens were taken between 11 a. m. and 12 m. One had a temperature of 110.4, another 110.0, another 110.5, and still another 110. The first of these in January carried a temperature of 107, the second 106.6, the third 108.0, and the last 107.1. The lowest temperature on June 1 was 108.

Some of these hens bearing the extreme temperatures June 1 laid that day and from appearance and former and past history were in perfect health. From this we gain the lesson that should we find the temperature of a fowl on a hot day as high as 110.5°, or 4.5 degrees above 107, which is usually accepted as normal, we would not be justified in saying that she had a fever or abnormal temperature due to disease; so that the temperature taking in birds is certain not to be of so great importance as in man or possibly mammals.

Kaupp and Herner (6) of the North Carolina Experiment Station and Manitoba Agricultural College, respectively, in a cooperative experiment determined the temperatures of Single

Comb White Leghorn hens. The hens were all reared at the Manitoba Agricultural College at Winnipeg, Canada. Twenty-five of the hens were kept at Winnipeg and twenty-five at Raleigh, N. C., a difference of 35 degrees latitude. Table 3 gives a summary of the monthly temperatures of the hens kept at Raleigh during the year extending from November, 1919, to October, 1920, inclusive. The weather temperatures here did not go quite so high as in the preceding report. However, one of the hens in June registered a temperature of 110.8, the only one that reached this point during these tests. It is interesting to note that on the days when the atmospheric temperature was between 73 and 80, the temperature of the hens, as an average, was 108 or above. All other temperatures were below 108, except on one day when the atmospheric temperature was 71 and the average temperature of the hens was 107.9. The lowest temperature as a monthly average was 107 and the highest was 108.7. The average of all months and of all hens was 108.

TABLE 3.—AVERAGE TEMPERATURES OF TWENTY-FIVE SINGLE COMB WHITE LEGHORN HENS AND ATMOSPHERIC TEMPERATURE.
(Temperatures taken first day of each month at Raleigh, N. C.)

Month	Year	Average temperature of hens	Atmospheric temperature
		° F.	° F.
November.....	1919	108.5	81
December.....	1919	107.5	51
January.....	1920	107.8	67
February.....	1920	107.8	29
March.....	1920	107.9	42
April.....	1920	107.9	71
May.....	1920	108.0	72
June.....	1920	108.7	84
July.....	1920	108.3	85
August.....	1920	108.3	86
September.....	1920	108.3	86
October.....	1920	107.0	63

The temperatures were taken, on the first day of each month, of the twenty-five Single Comb White Leghorn hens kept at Winnipeg. This was done under the supervision of Prof. M. C. Herner. Table 4 gives a monthly summary of these temperatures. The average temperature for the twelve months is 107.4. We do not find here the fluctuations from month to month that are observed in the other studies.

The average temperatures of fowls as recorded by different authors here cited are given in Table 5. The average for all authors and tests to date is 107.4. The average for the present author's three studies to this point is 107.4.

TABLE 4.—AVERAGE TEMPERATURES OF TWENTY-FIVE SINGLE COMB WHITE LEGHORN HENS AND ATMOSPHERIC TEMPERATURE.

(Temperatures taken the first day of each month at Winnipeg, Canada.)

Month	Year	Average temperature	Atmospheric temperature
		° F.	° F.
November.....	1919	108.6	18
December.....	1919	108.2	-16
January.....	1920	107.9	-6
February.....	1920	108.2	18
March.....	1920	107.8	30
April.....	1920	107.3	38
May.....	1920	107.3	62
June.....	1920	107.4	62
July.....	1920	107.7	82
August.....	1920	106.9	72
September.....	1920	107.4	67
October.....	1920	107.1	63

TABLE 5.—AVERAGE TEMPERATURES OF FOWLS AS RECORDED BY DIFFERENT AUTHORS.

Author	Temperature determination
	° F.
Colon.....	108.0
Smith and Mills.....	107.6
Hobday.....	106.9
Kaupp (1917 investigations).....	106.6
Kaupp (1918-19 investigations).....	107.7
Kaupp (1919-20 investigations).....	108.0
Herner.....	107.4

THE PROBLEM

The determination of the normal temperature of the fowl is of importance. In the clinical study of disease of fowls a knowledge of the normal temperature aids in determining whether or not the fowl has an elevation of temperature or fever.

Our problem consisted in determining the cloacal temperature of different groups and different breeds of hens at different periods of the twenty-four hours, to study further the influence of atmospheric temperature on the temperature of the body and to determine at what time in the twenty-four hours the body temperature is normal, that is, at what hour all surplus body heat accumulating during the day is gotten rid of.

EXPERIMENTAL METHODS

The temperatures were taken with a human size, one-minute, clinical thermometer. After shaking down the mercury below 100 degrees, the thermometer was inserted into the cloaca and allowed to remain for two minutes. The temperatures were taken at 5 p. m., 12 midnight, 5 a. m., and 12 noon. Care was taken not to excite or greatly exercise the hens, as such excitement we observed caused a rise of temperature in two or three

minutes. The breeds selected were Single Comb White Leghorns, Single Comb Rhode Island Reds and Barred Plymouth Rocks. The temperatures are studied in two groups, namely, males and females.

EXPERIMENTAL DATA

The results are given in Tables 6 to 8 and are summarized in Table 9.

TABLE 6.—TEMPERATURES OF SINGLE COMB WHITE LEGHORNS AT DIFFERENT HOURS
THROUGHOUT THE TWENTY-FOUR.
(Commenced February 20, 1922; completed February 21, 1922.)

Sex and No.	5 p. m.	12 midnight	5 a.m.	12 noon
Females:				
184.....	107.6	104.7	106.7	107
177.....	107.6	105.1	106.6	107
190.....	107.8	105.5	106.2	106
181.....	107.4	103.3	104.5	106.7
189.....	107	105	106.6	106.3
218.....	107.5	105.6	106.7	106.8
197.....	106.4	106.4	107.7	107.1
179.....	107.8	105.9	106.4	107
194.....	107.3	105.9	107.2	107.6
203.....	107	105.4	107.3	107.2
Average.....	107.5	105.2	106.5	106.8
Males:				
215.....	107.6	106.8	107.4	107.7
58.....	106.2	104.8	107.3	107.8
957.....	107.6	105.6	105.7	108.7 ¹
214.....	107	104.4	108.3	107.7
Average.....	107.1	105.3	107.1	107.9
Atmospheric temperature.....	72	59	54	57

¹ This bird was wild and struggled.

TABLE 7.—TEMPERATURES OF SINGLE COMB RHODE ISLAND REDS AT DIFFERENT HOURS
THROUGHOUT THE TWENTY-FOUR.
(Commenced February 25, 1922; completed February 26, 1922.)

Sex and No.	5 p.m.	12 midnight	5 a.m.	12 noon
Females:				
422.....	107.7	104.2	105.5	106.1
461.....	107.2	103.5	104.5	106.1
495.....	107	104.3	104.4	106.4
441.....	106.8	105.2	105.5	105.9
421.....	106.8	104.2	105.1	106.6
468.....	106.8	104.3	105	106.6
410.....	106.7	104.6	105.4	106.2
415.....	106.7	104.6	105.4	106.5
426.....	107	104.6	105.9	107.1
442.....	106.2	104.1	104.7	105.9
Average.....	106.8	104.3	105.1	106.3
Males:				
Blue band.....				
Green band.....	106.7	103.6	105.7	105.2
Green band.....	107.2	103.5	105.3	105.2
Green band.....	106.8	104.3	105.2	105.8
Average.....	106.9	103.8	105.4	105.4
Atmospheric temperature.....	56	51	47	45

Observations: The Rhode Island Reds are much more easily handled than the White Leghorns.

TABLE 8.—TEMPERATURES OF BARRED PLYMOUTH ROCKS AT DIFFERENT HOURS THROUGHOUT THE TWENTY-FOUR.

(Commenced February 27, 1922; completed February 28, 1922. Maximum atmospheric temperature February 27 was 70° F. and minimum 44, with a mean of 57. Maximum temperature February 28 was 60, minimum 46, average 53.)

Sex and No.	5 p.m.	12 midnight	5 a.m.	12 noon
Females:				
972.....	106	105.4	106.2	106.9
958.....	106.3	104.8	105.1	106.4
975.....	106.5	104.9	105.7	106.3
984.....	107.4	105.1	105.3	106.3
805.....	105.5	104	105.4	105.5
963.....	107.2	104.4	105	107.4
990.....	106	104.8	104	107.2
976.....	106.4	105	105.2	106.7
962.....	106	104.3	104.3	106.2
973.....	106	104	104.3	106.2
Average.....	1 6.3	104.6	105	106.5
Males:				
1.....	107.7	104.5	105.1	107
2.....	107.5	104.9	105.4	107.1
3.....	107.3	104	105.1	106.9
4.....	107.5	104.4	105.8	106.3
Average.....	107.5	104.4	105.3	106.5

Observations: The cocks are more excitable than the hens.

TABLE 9.—SUMMARY OF TEMPERATURES OF FOWLS TAKEN AT DIFFERENT PERIODS OF THE TWENTY-FOUR HOURS.

Breed	Sex	5 p.m.	12 midnight	5 a.m.	12 noon
S. C. White Leghorns.....	Hens	107.5	105.2	106.5	106.8
S. C. Rhode Island Reds.....	Hens	106.8	104.3	105.1	106.3
Barred Plymouth Rocks.....	Hens	106.3	104.6	105.0	106.5
Average.....	Hens	106.8	104.5	105.5	106.5
S. C. White Leghorns.....	Cocks	107.1	105.3	107.1	107.9
S. C. Rhode Island Reds.....	Cocks	106.9	103.8	105.4	105.4
Barred Plymouth Rocks.....	Cocks	107.5	104.4	105.3	106.8
Average.....	Cocks	107.1	104.5	105.9	106.7
Average of both sexes.....		106.9	104.5	105.7	106.6

DISCUSSION

The cloacal temperatures of three lots of adult fowls are here summarized. There is apparently no difference between the temperatures of the males and females.

The temperatures of these fowls were highest at night, gradually becoming lower after the fowl goes to perch till at midnight all surplus heat from the body is apparently eliminated and the average fell to 104.5° F. Nearing dawn the birds become restless and soon begin to move about, which causes surplus heat to accumulate in the body. At this time the average temperature was 105.7. From this time till noon the temperature gradually rose to 106.6 and by 5 p. m. had reached 106.9. These temperatures were taken during the month of February,

hence the fowls were not subjected to high atmospheric temperatures and as a result the temperatures are slightly lower than some given in the historical review where at the time of taking the temperatures hot noon-day weather prevailed. The average of the daylight temperatures was approximately 106.8, or 0.6 degree below the average of all authors quoted in the historical review.

From all studies recorded it would appear that 107.3° F. is an annual approximate temperature, while this is likely to be slightly more during warmer and less during the colder weather.

LATER TEMPERATURES OF SAME FLOCKS

The temperatures of the Single Comb White Leghorns recorded in Table 6 were taken February 20 and 21, and temperatures of the same flocks were again taken May 25 and 26. On this latter date the atmospheric temperature was higher, and it was the desire to determine if the average temperature of the flock would be higher in keeping with the increased atmospheric temperature. Temperatures were also taken at this time of the birds of the flock recorded in Table 7. These later temperatures are given in Tables 10 and 11. Table 12 gives the comparative results of the temperature readings for the two periods.

TABLE 10.—TEMPERATURES OF SINGLE COMB WHITE LEGHORNS AT DIFFERENT HOURS THROUGHOUT THE TWENTY-FOUR.
(Commenced May 25, 1922; completed May 26, 1922. Same flock as in Table 6.)

No.	5 p.m.	12 midnight	5 a.m.	12 noon
Hen 218.....	106.5	104.9	105	107
197.....	107.2	104.9	106.3	103.2
194.....	107.3	104.8	105.8	107
203.....	106.9	105.1	105.6	107.3
184.....	107.4	105.1	106	106.4
190.....	107	105	105.2	106.2
177.....	107.1	105.1	106	106.4
181.....	106.8	104.7	106	106.4
189.....	107.5	104.3	105.3	106.4
179.....	107.4	105.6	105.6	107.1
Average.....	107.1	104.9	105.6	106.3
Cock 215.....	108.2	105.4	106.3	107.5
Atmospheric temperature.....	79	70	65	83

The temperatures taken in May do not disturb the former figures and do not indicate that in 1922 the difference between the atmospheric temperatures of February and May was sufficient to cause a perceptible rise in body temperature of the flock as a whole. Other records have shown, however, that when

the atmospheric temperature rises above 70° F. there is likely to be quite an excess temperature stored up in the body and a rise above the average.

TABLE 11.—TEMPERATURES OF SINGLE COMB RHODE ISLAND REDS AT DIFFERENT HOURS THROUGHOUT THE TWENTY-FOUR.
(Commenced May 24, 1922; completed May 25, 1922. Same flock as in Table 7.)

No.	5 p.m.	12 midnight	5 a.m.	12 noon
421.....	107.2	105.1	106.3	106.2
461.....	106	104.2	105.1	105.9
442.....	107	105.7	106.2	107.4
410.....	106.4	104.5	106.2	106.3
468.....	107.6	106	107.4	106.3
495.....	106.4	104.6	106.6	105.9
426.....	107	105.2	107.2	106.2
422.....	107.9	105.2	106.4	106.6
415.....	105	104.2	105.5	107.1
441.....	106.6	104.9	105.7	106
Average.....	106.7	105	106.2	106.3
Cock B.....	107.4	104.8	106.8	106.5
Cock G. L. B.....	107.4	104.8	105.6	106.3
B-G Cock.....	107.3	104	105.1	106
Average.....	107.4	104.5	105.8	106.2
Atmospheric temperature.....	82	64	62	82

TABLE 12.—COMPARATIVE RESULTS OF TEMPERATURES OF SINGLE COMB WHITE LEGHORN AND SINGLE COMB RHODE ISLAND RED MALES AND FEMALES TAKEN IN FEBRUARY AND MAY, 1922.

Breed	Sex	Month	5 p.m.	12 midnight	5 a.m.	12 noon
S. C. White Leghorn.....	Hens...	Feb....	107.5	105.2	106.5	106.8
S. C. White Leghorn.....	Hens...	May....	107.1	104.9	105.6	106.3
Atmospheric Temperature.....		Feb....	72	59	54	57
Atmospheric Temperature.....		May....	79	70	65	83
S. C. R. I. Red.....	Hens...	Feb....	106.8	104.3	105.1	106.3
S. C. R. I. Red.....	Hens...	May....	106.7	105.0	106.2	106.3
Atmospheric Temperature.....		Feb....	56	51	47	45
Atmospheric Temperature.....		May....	82	64	62	82
S. C. W. Leghorn.....	Cocks ¹	Feb....	107.1	105.3	107.1	107.9
S. C. W. Leghorn.....	Cocks ¹	May....	108.2	105.4	106.3	107.5
S. C. R. I. Red.....	Cocks ¹	Feb....	106.9	103.8	105.4	105.4
S. C. R. I. Red.....	Cocks ¹	May....	107.4	104.5	105.8	106.2
Average of both sexes and breeds.....		Feb....	106.9	104.5	105.7	106.6
		May....	107.0	104.9	105.9	106.4

¹ Atmospheric temperature same as for hens.

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THE PROTECTION OF LAMBS FROM STOMACH WORMS

By COOPER CURTICE

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Animal Industry, Vienna, Virginia*

IN EXTENSIVE TESTS which have been carried on during the past eight years at the Bureau of Animal Industry farm near Vienna, Virginia, the use of bluestone solution is the only satisfactory means of controlling stomach worms under practical conditions that has been discovered. By its systematic use throughout the year stomach-worm infection has been easily, economically and effectually kept under control. Directions for the preparation and use of the remedy follow.

THE BLUESTONE REMEDY

The Stock Solution

A stock solution is prepared as follows:

Coarsely powdered bluestone (copper sulphate).....	1 pound
Boiling water	2 quarts

Add the bluestone to the water and dissolve it completely. Replace any water that evaporates to make a total of 2 quarts. Store in glass or stoneware, tightly stoppered. This will keep indefinitely and when diluted for use is sufficient for 400 doses. *This is a stock solution and must not be administered in this strength, for it will kill sheep.* It must not be allowed to lose water by evaporation.

Dilution for Use

For use 3 quarts of water is added to 4 fluid ounces of the stock solution for each 25 head of sheep to be dosed.

Apparatus

The apparatus needed consists of one four-ounce glass graduate, one graniteware quart measure, one graniteware gallon measure and one drenching tube. A baby's graduated nursing bottle may be used instead of the graduate and tube, but it is not so convenient and it takes more time. The drenching tube consists of three pieces fitted together in this order: A hard or flexible rubber or graniteware funnel, a 3½-foot rubber

tube and a 6-inch brass tube. The caliber of the rubber tube is three-eighths of an inch; the brass tube and the funnel fit into it. The outside diameter of the rubber tube is five-eighths of an inch. A thinner tube has proved less convenient to handle and less durable.

The Dose

The bluestone is used only after dilution by the addition of water to the stock solution. Four fluid ounces of the diluted solution is given to each sheep weighing 80 pounds or over. The weight of the sheep may be estimated, but the doses are measured accurately, not guessed at. For a lamb of 60 pounds a dose of 3 fluid ounces and for a lamb of 70 pounds $3\frac{1}{2}$ fluid ounces is used.

It has been found unnecessary to take the sheep from the pasture until a short time before dosing. A convenient small pen is prepared either within or next to a large one, so arranged that a few sheep may be driven in quickly and individual sheep released outside after dosing.

Dosing the Sheep

Two persons are necessary to give the dose. One straddles the sheep, holds its muzzle with one hand and inserts the tube four inches into its mouth with the other. The other measures the dose, holds the drenching tube and pours the dose into the funnel. Backing the sheep into a corner helps to steady it. The sheep should remain standing with its head nearly horizontal, and care should be taken not to choke or strangle it. Plenty of time should be allowed for it to swallow. Moving the tube in the mouth often aids in getting the sheep to swallow. More than 50 sheep may be dosed in an hour by experienced operators, but *carelessness and haste are dangerous and must be avoided*. The dosing should preferably be done under competent veterinary supervision. In any case it should not be entrusted to inexperienced or naturally careless persons.

Time of Dosing

All sheep on the farm, except young lambs are dosed regularly every four weeks throughout the year, but pregnant ewes are not dosed within two weeks of lambing. The dosing of the ewes is renewed at the next regular dosing date after lambing. If for any reason it has been necessary to change the date of dos-

ing, a slightly earlier day has been chosen rather than a later one. Sheep occasionally have been dosed one week after a previous dosing without apparent harm. Under such circumstances the next dose follows in four weeks. During the growing pasture season three-week intervals between doses are better than four-week intervals. The regular dosing of lambs is begun as soon as they are weaned.

SUPPLEMENTARY CONTROL MEASURES

Medicinal treatment of the flock, though it has greatly reduced losses from stomach worms, even when the same pasture land is used continuously, has given much better results when supplemented by frequent changes to clean or only slightly contaminated pastures. At the Vienna farm it has been found that yearlings and older sheep under systematic bluestone treatment may be pastured almost anywhere with little or no damage by stomach worms. Younger lambs, however, may not altogether escape injury unless precautions are taken in addition to the medicinal treatment of the ewes. Young lambs have not become seriously affected with stomach worms while running with older sheep in barns and yards free from vegetation and from which the manure had been removed prior to lambing time.

The important precaution taken in addition to the periodical treatment of the ewes has been to provide for the lambs and ewes pasture that is free or almost free from worm infection. This has been accomplished by utilizing fields of planted crops such as rye, wheat, oats or barley, not occupied by sheep or cattle since the plowing of the fields. Creeps or hurdles to enable the lambs to graze ahead of the ewes and temporary divisions of fields have also been employed as expedients to provide clean grazing for the lambs.

Grass land may be used sparingly if there have been no sheep or cattle on it within a full year previously. Cultivation greatly reduces the infection of the soil, and much of the infection dies out on pasture land from which sheep or cattle have been excluded for at least a year.

By thus utilizing clean or only slightly infested fields, meanwhile not neglecting the monthly dosing of the ewes, and making sure that they are well fed to favor copious milk production, lambs born in February and March have been reared to

marketable age at the Vienna farm before the most dangerous part of the stomach-worm season, namely, the period from July to October in the latitude of Washington, D. C.

It is true that even with these precautions the lambs have sometimes picked up a few worms, but these have not been numerous enough to do serious immediate damage. Nevertheless, as a few worms carried by the lambs are likely to infect fields or pastures to which the lambs are moved after weaning, it has been assumed that lambs kept continuously on one field or pasture after weaning will scarcely escape further stomach-worm infection, even though the field or pasture is quite clean when the lambs are placed on it. The lambs, having brought with them a few worms that will produce eggs to contaminate the new pasture, pick up young worms resulting from this contamination, and these produce eggs to contaminate the pasture still further. Additional infection is then likely to be picked up by the lambs, leading to greater contamination of the pasture, and so on, in increasing progression, until the worms become so numerous in the lambs as to cause serious damage. Accordingly when weaned and separated from the ewes the lambs that were retained for breeding stock or for marketing later in the year were given occasional changes of pasture as before weaning, utilizing fields of stubble, rape, soy-beans, clover, grain, etc. As already noted, when the lambs were weaned they were started upon the routine of periodical treatment with bluestone solution.

The lambs have thus been doubly safeguarded. First, the use of clean or nearly clean pasture has reduced the chances of their picking up many worms, and second, the bluestone treatment has destroyed most of the worms that the lambs may have picked up from time to time, thus retarding and minimizing the contamination of the pasture.

On the Vienna farm during the systematic application of the bluestone treatment it has been found that special precautions as to pasture may be gradually relaxed in the late autumn and that the sheep may thereafter be pastured wherever convenient with little danger of damage from stomach worms.

ADVANTAGES OF THE BLUESTONE TREATMENT

Sheep regularly dosed with bluestone and otherwise properly cared for have weighed more, produced more wool, and

have been better milk producers than untreated sheep. Their lambs from birth have been healthier. Untroubled by worms and getting plenty of milk, the lambs have thrived and grown rapidly, reaching a marketable size at the age of three to five months. The yearling ewes saved for breeding purposes, having grown well as lambs, have continued their growth. They commonly have become larger ewes than their dams, in cases in which these latter were raised without precautions against worm infestation. At slight expense the bluestone treatment has greatly increased profits in the production of mutton, wool and breeding stock.

SUMMARY OF METHOD OF PREVENTING STOMACH-WORM LOSSES

All sheep on the farm are dosed with bluestone solution every four weeks throughout the year, except unweaned lambs and pregnant ewes within two weeks of lambing.

Manure is removed from barns and yards before lambing.

The unweaned lambs and the ewes to which they belong are kept on forage fields and pastures that are as free as possible from previous contamination by sheep and cattle, and the flock of ewes and lambs is changed to fresh fields as frequently as possible. Creeps or hurdles, allowing the lambs to graze ahead of the ewes, have been found useful.

Treating the lambs with bluestone is begun at weaning time, and they are then kept on fields and pastures that are as clean as possible, changing frequently to fresh ground. They are, however, excluded from fields and pastures that are to be used for handling the next lamb crop, unless the land is to be plowed up and planted before it is used again.

VIRULENCE OF BLOOD OF AN APPARENTLY RECOVERED CASE OF SWAMP FEVER

The following interesting case report has been recorded by the office of the Veterinary Director General of Canada: A heavy gelding now about 20 years old first showed swamp fever infection in 1911. For the last eight years no definite symptom of the disease has appeared and this horse had done some work. The blood of this gelding injected into a healthy horse in April, 1922, has produced swamp fever—over *ten years* since the infection occurred, and in spite of the apparently normal condition maintained.

A NEW METHOD FOR DETECTING THE EGGS OF PARASITES IN FECES

By THEODOR VAJDA

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IN OVER A YEAR I have made well over 1,000 fecal examinations and found that in the feces of domestic animals *Coccidium*, *Ascaris*, *Strongylus*, *Oxyuris*, *Dochmius*, *Oesophagostomum*, *Trichuris* and *Dipylidium caninum* eggs can be detected easily and in great amount by the following method:

Dilute the feces with water and mix well with glycerin (sp. gr. 1.25) in a short test tube with a large opening or in a conical medicine bottle of 10 to 25 grams capacity. This mixture should be left standing for one-half to one hour, or centrifugalized and examined after being left standing for a certain time. The quantity of water to be mixed with the feces depends on their origin and constituency. A given amount of horse or hog feces of normal constituency should be mixed with twice this amount of water; a given amount of sheep, goat or dog feces with three times this amount of water. For soft feces the amount of water should be diminished, and in cases of diarrhea the feces must be examined without the addition of water.

I have found that there is a difference in the specific gravity of the eggs of the different parasites, therefore I have had to vary the quantity of glycerin according to the species of parasites involved. To isolate the maximum number of eggs I use one part of glycerin to get *Strongylus*, *Oxyuris*, *Dochmius* and *Oesophagostomum* eggs, and this amount also served in the case of *Coccidium*, $1\frac{1}{2}$ parts for *Ascaris megaloccephala* and 3 parts for *A. marginata*, *A. lumbricoides* and *Trichuris*. If more than the amount of glycerin stated here is used, the amount of eggs recovered is not materially diminished, but if less is used some eggs, for instance, those of ascarids, can not be detected at all.

From the surface of the feces prepared with glycerin, or from the liquid strained through linen, eggs can be detected after a few minutes. Their number increases considerably after standing $\frac{1}{2}$ to 1 hour. If the preparation is centrifugalized at moderate speed for 15 to 20 minutes and allowed to stand a few minutes

one can obtain a great number of eggs by carefully removing them from the surface with a glass rod. (See illustration.) I found it very important to take great care in touching the surface of the centrifugalized feces-water mixture with a dry, clean glass rod, because if this rod is dipped into the liquid much fewer eggs are recovered. The same is true if a pipette is used.

Thousands of *Ascaris* eggs can be recovered when present if we mix and stir well a large quantity of horse or hog feces with double this amount of water and strain it through gauze, bringing the four corners of the gauze together and pressing out the liquid. After centrifugalizing at moderate speed for 30 minutes the liquid on top of the sediment can be poured out (keep about 1 to 2 c.c.), as it does not contain any eggs. The sediment should be mixed carefully with $1\frac{1}{2}$ parts of glycerin for horse feces and 3 parts for hog feces by means of a glass rod, again centrifugalized for 15 to 20 minutes and left to settle for a short time. The milky white surface of the liquid, which is light brown, will contain a great amount of eggs if many ascarid eggs are present in the feces examined.

The eggs remain a long time unchanged on the surface of the feces thus prepared with glycerin, and the embryos in the eggs develop to a certain degree. In the eggs of *Ascaris marginata* moving embryos can be detected as early as the sixth day, and they are still motile after a month, because the glycerin does not penetrate into the inner part of the eggs. After standing 3 months a great number of deformed *Strongylus* eggs with granular protoplasm and even a greater number of *Ascaris megalocephala* eggs containing nearly unchanged and well-developed embryos were found.

All the eggs can be removed from the surface of the liquid by the following method: Fasten filter paper by means of a string at the mouth of a test tube and dip it into the large centrifugal tube which contains the feces-glycerin mixture, until the whole surface of the filter paper touches the surface of the liquid. The filter paper must be dried afterwards. *Ascaris* eggs can be taken for examination from such filter papers, kept in a well-closed glass, and after 8 months are easily discernible if kept for a short time in water containing glycerin. This method can be put into practice in cases where animals are suspected of having ascarids and there is no opportunity to make a microscopic examination on the spot. Instead of sending the

feces, which will rapidly decompose, to the laboratory, we send the filter paper treated as noted above.

Fluke eggs can not be isolated by this method. They are deformed and break up after a few minutes' exposure to the glycerin. I could not increase the resistance of the fluke eggs to the action of glycerin either by treating them with formalin or by boiling them. It would be very interesting to determine by experimentation whether the necessary amount of glycerin introduced into the alimentary canal has the same effect on the fluke eggs or not.

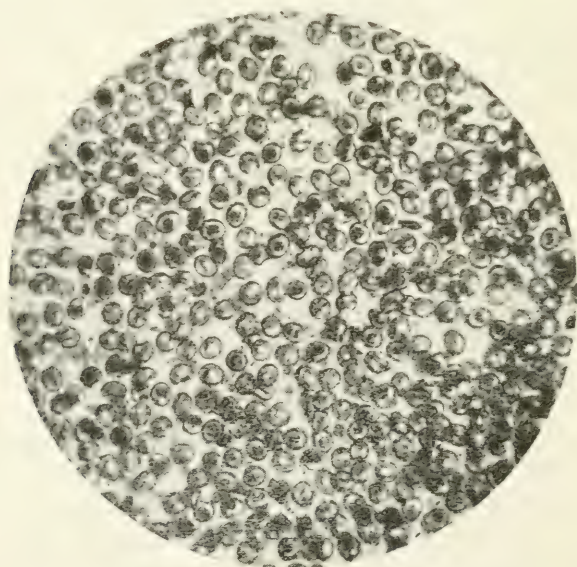
The advantages of the above-described method are the following:

1. A great number of eggs can be isolated even from a very small quantity of feces ($\frac{1}{2}$ gram). We counted 1,358 *Ascaris lumbricoides* eggs in one preparation and 1,130 in another.

2. The eggs become more transparent and their structure is more readily visible.

3. They keep their original form for a long period.

4. The liquid separated from the surface of the glycerin-feces mixture can be examined under the microscope without using a cover-glass and can be kept for several days without desiccating.



A small part of eggs of *Ascaris Marginata* isolated by the author's method from 10 grams of fresh dog feces.

FATALITIES IN CATTLE DUE TO THE TICK *DERMACENTOR VENUSTUS*¹

By E. A. BRUCE

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THE TICK *Dermacentor venustus* is found throughout the greater part of southeastern British Columbia, and in the early spring frequently causes paralysis and sometimes death in man and animals. The condition is exceedingly common among sheep, by no means uncommon in children, rare in adults, and comparatively rare in dogs. Although this is the commonest tick on cattle, with the exception of *D. albipictus*, no records have been made as to its causing trouble in such animals. It is therefore of interest to note that two fatal cases have recently come to our notice.

In sheep, man and the dog it is known, largely through the work of Hadwen, that paralysis and even death may be caused by a single tick. Only the females are incriminated and they are not liable to cause serious trouble unless feeding fast.

I am indebted to Mr. T. A. Moilliet of Vavenby (90 miles north of Kamloops) for information covering the two cases described below, and for specimens of the ticks, six gorged females and one male of *D. venustus* being received. Mr. Moilliet is an educated man, and has had some considerable experience with tick paralysis in sheep, the writer having visited his ranch in the spring of 1920, at which time he had had about 300 sheep affected out of a band of 400.

It is perhaps of interest to mention briefly this particular outbreak in sheep, as it gives an excellent idea as to how soon the condition may develop after exposure to ticks. Turned out on range April 5. First case, yearling ewe, on the 13th. Two cases on the 14th. On the 16th practically the whole band affected, yearlings worse than older sheep. On the 17th about 300 of the sheep were treated around the neck region with a 60 per cent creolin dip solution, the other 100 being treated as the necessity arose, and gorged female ticks being removed by hand. (This treatment is not recommended, as the solution is

¹ Published by permission of Dr. F. Torrance, Veterinary Director General of Canada.

hard on the hands and has apparently no effect on ticks that were already attached.) On the 18th some of the affected sheep were getting better and others worse. On the 19th improvement was marked. This continued, and on the 25th the sheep were moved from the hills to meadow land. On the 28th these sheep were seen by the writer. On going through the band a few showing slight symptoms of incoordination were seen, and one paralyzed case was found. This was a yearling upon which 10 females were found gorging, the majority being in the vicinity of the spinal column. After careful search all gorging females were removed (about noon), and toward night the sheep was eating, and while distinctly groggy was recovering nicely.

CASES IN CATTLE

Some affected cattle were imported from Alberta the preceding fall.

Symptoms are said to be the same in both sheep and cattle, the animals falling for no apparent reason, and when down manifesting a continual walking movement of the feet and no movement of the bowels.

Case No. 1.—Two-year-old heifer, pregnant, in poor condition. Found dead April 25. Had probably been dead two days, and judging from the hole it had dug with its feet had been down at least 24 hours before it died.

An area about an inch across was found just back of the horns at the base of the skull, that was covered with the excrement of ticks. There were four other places along the spine that showed where ticks had attached either singly or in small groups.

Case No. 2.—Two-year-old heifer, same age and condition as preceding case. When seen April 25 was alive and had been down probably 12 hours. Was offered water and drank a pail and a half. About six inches in front of the kidneys and close to the spine a large area about three inches in diameter was found that was covered with ticks. The majority of these were gorged females, but a number were only partially gorged, and several males were noticed to be moving around among the females. It is estimated that over a hundred ticks were on this area. There was also a much smaller area at the base of the skull, and several other places where ticks were attached singly. As the owner of these cattle lived some miles away, he was ad-

vised as to their condition. On my return in ten hours later the heifer was found to be dead.

Although these cattle were in poor condition, as is usual at this time of year, they were not so poor as to become weak, and food was plentiful, the bunch grass being four inches high. Neighboring cattle turned out a week earlier in a country where there was less feed but no ticks did well.

To sum up, ticks taken off the paralyzed heifer proved to be *Dermacentor venustus*. Knowing the dangerous character of this tick and the excellent reputation of the man who reported the condition, there seems to be no doubt whatever that death in the two cattle mentioned was due to *D. venustus*. The fact that the animals had been recently imported is another strong link in the chain of evidence, as they would not enjoy the same immunity as native stock.

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A delegation consisting of Drs. McGilvray and Campbell, Toronto; Drs. Daubigny and Dauth, Montreal; Dr. Hollingsworth, Ottawa; Dr. Bradshaw, Manitoba, representing the Veterinary Associations of Ontario, Quebec and Manitoba, was received by the Honourable Mr. Motherwell, Minister of Agriculture. The Veterinary Director General and the Chief Animal Pathologist were in attendance.

The delegates presented an appeal for better facilities for laboratory work, veterinary research and cooperation to enable the veterinary profession of Canada to extend their efforts towards the welfare of the animal industries.

Dr. E. A. Bruce addressed a meeting of the local branch of the Canadian Technical Agriculturist Association in Vancouver, April 4, on problems in animal pathology of special importance to British Columbia. "Redwater" of cattle was mentioned as a problem in which cooperation between pathologists and soil experts was needed.

A FATAL DISEASE OF YOUNG PIGS APPARENTLY CAUSED BY THE BACILLUS OF SWINE ERYSIPELAS

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THE ANNOUNCEMENT in May, 1921, by Creech¹ that "diamond skin" disease of hogs is a manifestation of chronic swine erysipelas, and since then the report by A. R. Ward² of the isolation of *Bacillus erysipelatis suis* in certain cases of polyarthrititis in swine, have given rise to much speculation as to whether or not the acute type of the disease exists in this country. Quite recently the writer encountered what he believes to be an essential bacteriemia in a three-week-old suckling pig in which *B. erysipelatis suis* was the invader.

ISOLATION AND STUDY OF THE ORGANISM

The pig died about 10 o'clock in the morning and was brought to the laboratory within less than four hours after death in very good condition for bacteriologic study. The heart's blood, lungs, liver, spleen and kidney were cultured at once in beef infusion broth, glycerin agar and serum agar. Examined after about 48 hours' incubation, all the solid media showed delicate growths suggestive of that of a streptococcus. The broth cultures were all faintly clouded. With the exception of a single colony of a contaminating organism in the culture from the heart's blood, all the cultures were pure. The organisms were found to be non-motile, Gram-positive, slender rods, straight or somewhat curved, and varying in length from 1 to 4 microns. They occurred singly, in pairs, or in short chains of a few elements, and often, in preparations from broth or solid medium cultures, they appeared as a tangled clump of organisms.

CULTURAL CHARACTERS

The growth on plain agar, glycerin agar or serum agar was essentially the same. In 24 hours there appeared small, round,

¹ G. T. Creech. The bacillus of swine erysipelas isolated from urticarial lesions of swine in the United States. Jour. Amer. Vet. Med. Assoc., 1921, vol. 59, p. 131.

² A. R. Ward. The etiology of polyarthrititis in swine. Jour. Amer. Vet. Med. Assoc., 1922, vol. 61, p. 155.

glistening, grayish white colonies which increased only slightly in size after two or more days' incubation and tended to remain discrete. The growth was never abundant. In broth there was a slight uniform clouding with a small amount of whitish sediment. The organism developed in milk without producing any change in the medium after several weeks' incubation. No visible growth occurred on potato. No indol was produced. Lead acetate agar was blackened in 24 hours. In gelatin stab cultures the growth extended outward from the line of inoculation in fuzzy branches producing the "test-tube brush" appearance described as typical for swine erysipelas cultures. No liquefaction of the medium occurred after 3 weeks' incubation at 20° C. Solid serum gave a delicate growth with no liquefaction of the medium. The following sugars were attacked with the formation of acid, but no gas: Dextrose, lactose, maltose, galactose and levulose. No acid or gas was formed in saccharose, salicin, mannite, dulcitol, raffinose and arabinose.

PATHOGENICITY

White mice inoculated intraperitoneally with 0.1 c.c. of a 24-hour broth culture succumbed in from 3 to 5 days. Pure cultures were obtained from the heart's blood and organs of the mice. Pigeons died in about 3 days following intravenous injection of 1 c.c. of a 24-hour broth culture. The organism was recovered from the muscles, blood, and liver of the pigeons. Rabbits were made ill for a day or two by intravenous inoculations, but recovered. Guinea-pigs proved completely refractory. An eight-weeks-old pig was injected intravenously with 1 c.c. of a 24-hour broth culture (second generation on artificial medium), and a boar about 10 months old was intravenously injected with 1 c.c. of a four-day broth culture (third generation on artificial medium). No symptoms of illness developed in either case during a period of observation extending over 3 weeks. An eight-weeks-old pig inoculated subcutaneously with 1 c.c. of a 24-hour broth culture (second generation) remained healthy.

From the foregoing description it will be seen that our organism agrees in all essential morphologic, staining and cultural characters, as well as pathogenic properties, with the bacillus of swine erysipelas.

POSTMORTEM FINDINGS

The following notes were taken at the autopsy of the pig:

The skin of the snout is slightly reddened. Elsewhere no gross alterations are observed in the skin or subcutaneous tissues. The cervical and inguinal lymph glands are somewhat enlarged and reddened. There is a small quantity of clear serous transudate in the pleural cavity. Both lungs are congested. A few petechiae are present on the auricles and coronary region of the heart. There is no evidence of endocarditis or valvular lesions. The peritoneal cavity contains a slight excess of fluid. There are several red, eroded areas in the mucosa of the pyloric region of the stomach. The mucosa of the small intestine is considerably reddened for the greater part of its extent. A few petechiae are present in the cortex of the kidneys. No gross alterations are found in the spleen. The mesenteric lymph glands are enlarged and reddened. The carcass is in a very well nourished condition.

HISTORY

The owner of the pig furnished the following history:

The farm on which the pig was raised is located in Virginia not far distant from Washington. For about four years previous to last fall, when three purebred Poland-China sows were bought, no hogs had been kept on the premises. The sows, which were purchased with the understanding that they were cholera immune, were placed in the old hog lot, and this spring each sow farrowed a litter of pigs. During the morning of April 1, three of the pigs of one litter, which were apparently healthy the evening before, were found dead in the pen. The pig brought to the laboratory was one of these animals. The sow with these pigs appeared only slightly off condition at this time, but a few days later became very much worse and on April 6 refused all food. On April 7 the sow's temperature was 106.5°, and it was thought that she would not survive. Another of the sows was also ill for several days at the same time that the first sow sickened. This animal was dull and off condition, but did not completely lose its appetite. On April 7 its temperature was 104.2°. The third sow, which had not been in contact with the other animals, remained healthy. On April 3 the suckling pigs, 14 in all, appeared well and were injected with 20 c.c. hog-cholera serum alone. No losses oc-

curred amongst the pigs during the following three weeks. On April 7 each of the three sows was injected with 3 c.c. hog-cholera virus and 150 c.c. serum. The two sows which were ill at this time made an almost complete recovery within about a week and since then have not been off feed. The third sow remained healthy following vaccination.

DISCUSSION

It is unfortunate that all of the material which we had for study was disposed of before we could undertake inoculation tests for determining the presence of cholera virus. The definite exclusion of cholera in this case, we believe, would have materially strengthened the diagnosis of acute swine erysipelas. In spite of the fact that the erysipelas organisms were found in large numbers and in pure culture in the blood and organs of the pig, there may yet be doubt in the minds of some that this is an uncomplicated case of acute swine erysipelas.

Dr. G. J. Gruenwald was transferred from Madison, Wisconsin, on hog-cholera control to the same class of work in West Virginia, with headquarters at Charleston, effective June 19, 1922.

Dr. Herman Greeder, attached to the Bureau force on hog-cholera control in Oklahoma, resigned from the service June 1. The vacancy thus created is being filled by the transfer of Dr. G. E. Abrams from Pierre, South Dakota.

Dr. J. A. Grau, for a number of years assigned to hog-cholera work in Nebraska, is being transferred to Olympia, Washington, to conduct the same class of activities in that State.

Dr. J. F. Chipman has been transferred from Frankfort, Kentucky, to Troy, Alabama, effective July 1. Dr. Chipman will continue in hog-cholera work.

Dr. H. E. Smith goes from hog-cholera work in Nebraska to the same class of work in Texas, effective July 1.

Dr. E. E. Clore, who has been assigned to hog-cholera work in Indiana since 1918, has been transferred to South Dakota to engage in the same class of activities.

Dr. A. M. Meade has been transferred from hog-cholera control work in Illinois to a similar project in Georgia. Dr. Meade reported to Dr. A. L. Hirleman at Atlanta on July 10.

MISCELLANEA ANATOMICA

II. A NOTE ON THE THORACIC AND LUMBAR VERTEBRÆ OF THE HORSE

By SEPTIMUS SISSON

Professor of Anatomy, College of Veterinary Medicine, The Ohio State University, Columbus, Ohio

IN the December, 1921, number of the JOURNAL there appeared a communication from Dr. Schwarzkopf entitled "The Occurrence of Five Lumbar Vertebrae in the Morgan Horse." This was written in response to a request by the Editor in the September number for information concerning this matter and closely related data.

The present writer is somewhat diffident about discussing this topic, since he has had exceedingly little opportunity to make observations on purebred Arab and Morgan horses, and has been unable to obtain any considerable amount of data based upon careful studies by competent observers of these types. He has had, however, opportunity to observe the dissection of a large number of horses of various types during the past thirty years, and during the last decade has been specially interested in the subject of costal and vertebral variations in the horse. A few observations on this general topic may be of some interest. No attempt will be made here to go into the literature of the subject, but a few references will be appended for the benefit of those who may wish to use them.

In the first place we must agree as to how exactly we distinguish between thoracic and lumbar vertebrae. For the present purpose at least the usual understanding is that thoracic vertebrae are characterized by the presence of facets with which ribs articulate, while lumbar vertebrae have instead a lateral extension on each side which is termed the transverse process. This distinction is simple and is sufficient in those cases in which it can be used. But unfortunately this criterion fails in many cases. In many horses there is an ambiguous vertebra at the thoraco-lumbar junction. Most often apparently the atypical vertebra is the twenty-sixth. A simple and frequent form of the variation is that in which the vertebra is typically thoracic on one side and lumbar on the other. Another is the existence

of a costiform process or extension of the transverse process on one side or both. This often resembles the usual eighteenth rib so closely that it would be so diagnosed in examining the living subject and might even escape notice or proper interpretation in dissection. The costo-transverse process, if we may so designate it provisionally, may be fused with the body of the vertebra or form a diarthrosis with it.

In a good many horses the twenty-sixth vertebra has on each side a facet for articulation with a rib which differs in no important way from the usual eighteenth rib. In the great majority of such subjects there are five succeeding vertebræ which are typically lumbar. In a small number of cases in the draft, grade and light horses (exclusive of Arabs and Morgans) which the writer has observed these and other variations which can not be detailed here involve the twenty-fifth vertebra. In them the presacral vertebræ which were clearly lumbar in type were usually six in number, but in a very few cases there were only five.

The American Museum of Natural History has, it is generally conceded, the best and most extensive osteological collection relative to ancestral and existing Equidæ. Last spring the writer addressed an inquiry to the Museum for information derived by the Museum workers from this collection bearing upon the topic now under discussion, and asking especially for phylogenetic data which might throw some light on the significance of the numerical and morphological variations which are observed in existing Equidæ. Mr. S. H. Chubb, an experienced member of the Museum staff, kindly replied to this request, and his statement is almost verbatim as follows:

It seems to me that the short back, which might tend toward the reduction of ribs, is the more highly specialized type. On the other hand, the occurrence of an extra pair of ribs in the modern Equidæ is generally, though not always, at the expense of the lumbar region, and hence does not affect the total number of back (thoraco-lumbar) vertebræ.

Of course it is the ancestral horses which should be expected to answer this question. Although we have a remarkable collection of fossil Equidæ, it is unfortunate that in almost every specimen there are a few vertebræ missing, so that they give us little information on this point.

In looking over our collection of about thirty-five specimens of the modern Equidæ it is interesting to note that in *Equus caballus* there are comparatively few exceptions to the rule of 18-6. These exceptions are included in the inclosed list (vide infra). You will note that the Arab, which we regard as a distinct species, is among these

exceptions. In looking over my letter I fear I have rather evaded your question, but the truth is there are so many points unsolved even though we have a very good study collection.

The table, so far as it relates to existing horses, is as follows:

	Dorsal or rib-bearing vertebræ	Lumbar vertebræ
Arabian	18	5
do.	18	5
do.	17	6
Arabian-Trotter cross.....	18	5
Common horse.....	19	6
do.	19	6
do.	19	5
Trotter, probably much Arabian blood.....	18	5
Morgan, probably much Arabian blood.....	18	5
Prjevalsky horse.....	19	5
do.	18	6
do.	18	6
do.	18	6

This table does not, of course, provide a sufficient basis for conclusions of any great value. It tends to indicate, however, the probability that further careful observations may show that purebred Arab horses and others which have in them much Arabian blood commonly possess only 23 vertebræ in the back and loins, of which five are usually lumbar. One exception appears among the six listed in the table, that of an Arab with 6 lumbar vertebræ and 17 thoracic. The four Prjevalsky horses listed all have 24 vertebræ in the back and loins; one of these has the formula 19-5, the other three have 18-6.¹ The writer is inclined to the view that this finding is in pretty close conformity with the condition found in the majority of existing horses, with the possible exception of the Oriental type. Last month we dissected a grade draft mare (chiefly of Percheron blood) of which the seventeenth vertebra in the back was thoracic on one side and lumbar on the other, and there were five typical lumbar vertebræ. Apparently no certain means has been devised by which one may recognize the existence of the nineteenth rib in the living horse. The evident existence of a rib more on one side than on the other is not diagnostic. It seems plausible to suppose that one could depend on the distance between the tuber coxæ (external angle of ilium) and the last rib, but this does not appear to be a reliable criterion

¹ Salensky in his monograph on *Equus prjevalskii* gives the number of thoracic vertebræ as 18 and the lumbar as 5.

as to whether there is an additional rib on one side or a reduction on the other side. It can only be said that experience enables one to "guess right" rather frequently. Of course the matter could be cleared up by the use of X-rays.

It might naturally be supposed that there would be a direct relation between shortness of the loin and the existence of five lumbar vertebræ. In the opinion of the writer this inference is unsafe, and he has been unable to find data of scientific value which establish a direct relationship between the length of the back and the number of vertebræ. On the other hand we find ample illustration of the lack of such a correlation.

The writer is unable to agree with Dr. Schwarzkopf in his view that observations strongly indicate the existence of a tendency to eliminate the sixth lumbar vertebra in breeds used under the saddle. Numerical reduction could occur by coalescence or agenesis of segments, and the facts in this regard would have to be determined by embryological investigation. Phylogenetic studies might throw some light on the question. The occurrence of ankylosis of variable extent in this region is, of course, quite common, especially in old horses. But there seems to be no good reason, at present at least, to assign to this process any significance other than the generally accepted view that it is traumatic.

The question of the mechanical value of the short back is one upon which the opinion of a mere anatomical worker is of little value. It would seem that this conformation would be stronger and better adapted for carrying weight, but would be inferior in elasticity, especially if the number of vertebræ is reduced. In studying the mechanism of the back and loins the vertebræ should be considered in two other respects: (1) The line formed by the summits of the spinous processes is of course quite evident in the living animal. (2) The direction of a line passing through the bodies of the vertebræ is in great part different from the preceding and forms the real vertebral axis. In the loins and the posterior end of the back the two lines are practically horizontal and parallel. The highest point of the withers is preferably about two inches higher than the highest part of the croup. The vertebral axis, on the other hand, curves very decidedly downward in its anterior part. Curvature in its lumbar part is normally slight. Many skeletons are mounted

incorrectly in these respects and in other ways as a natural consequence.

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DR. MOORE LEAVES ST. JOSEPH VETERINARY COLLEGE

Dr. R. C. Moore, for a number of years Dean of the St. Joseph Veterinary College, has discontinued his official connection with that institution and turned over its management to Dr. F. M. Cahill.

Dr. Moore has suffered a nervous breakdown that was seriously affecting his eyesight and heart, and his physician advised him to discontinue all heavy strain upon his nervous system. He has accepted a position with the Jensen-Salsbery Laboratories, of Kansas City, Mo., and will establish a distributing point in St. Joseph which will furnish him the outdoor exercise recommended for the restoration of his health.

Advice has just been received from the New York Veterinary College, New York University, New York City, to the effect that operations have been temporarily suspended. This action was recommended at the recent meeting of the Alumni Association of that college and was concurred in by the Chancellor of the University.

George Oberholtzer, a master-truckman of Philadelphia, said at a meeting held in that city, May 10, 1922, "Three years ago I had 23 motor trucks and no horses, now I have 46 horses and only five motors, and am ready to dispose of these five."

CLINICAL AND CASE REPORTS

(Practitioners and others are invited to contribute to this department reports of unusual and interesting cases which may be helpful to others in the profession.)

A FATAL CASE OF RABIES IN MAN

By B. SCOTT FRITZ

*Agent in Charge, Pennsylvania Bureau of Animal Industry,
Philadelphia, Pennsylvania*

THE HEAD of a dog suspected of rabies was sent to the laboratory of the Pennsylvania Bureau of Animal Industry May 19, 1922, by Dr. Edgar W. Powell, a practicing veterinarian of Bryn Mawr, for diagnosis. The laboratory diagnosis was positive.

History.—On May 14, 1922, a white beagle dog with brown ears, the owner of which was not known, in the vicinity of Ardmore, bit a child badly about the face. The father of the child that was bitten, being familiar with the danger accompanying a dog bite, informed the police of Ardmore of the case, who caught the dog and turned it over to Dr. Powell, who in turn held it under observation. On May 19 the dog showed clinical symptoms of rabies and was killed, and the head was forwarded to the above mentioned laboratory for a confirming diagnosis. The laboratory diagnosis was positive to rabies and the parent of the child bitten was notified by telephone. An attending physician was called and the Pasteur treatment was given. The treatment, so far as we know to date, was successful.

On June 5 a physician at Villa Nova College called this laboratory, requesting of us any history of rabies in that vicinity. We informed him of the above mentioned case as cited. He in turn informed us of having under his observation a student at the college showing symptoms of which he was suspicious of rabies, and stated that if he could associate rabies with a bite this student had received on May 14 a diagnosis of rabies would be certain.

By investigation through our Bureau, the attending physician and the Ardmore Bureau of Health, it was proved that the dog which had bitten the child also bit the student, on

the same date. The student saw the dog lying in the gutter on the morning of May 14, in Ardmore, and thinking the dog had been run over by an automobile, stopped to pet it, and the dog jumped up and bit him on the lip. The student not being alarmed by the nature of the bite, had the wound cauterized and forgot the incident until being brought under the observation of the physician.

On June 7 the student died, showing typical symptoms of rabies. The student's brain was brought to our laboratory and the physician's positive diagnosis of rabies was confirmed.

Conclusion.—Observe from the case cited that the dog bit the child and the student about five days before having shown clinical symptoms. The Pasteur treatment was given the child immediately after the date of the laboratory diagnosis of rabies in the dog. The student did not receive antirabic vaccine and showed symptoms of rabies in about twenty-one days after the date of the bite, and died on the twenty-third day. A positive diagnosis of rabies was made in our laboratory.

SOME CLINICAL DATA FROM NORMAL SHEEP URINE

By JAMES F. COUCH

*Pathological Division, Bureau of Animal Industry,
Washington, D. C.*

IN THE COURSE of the investigations of stock-poisoning plants conducted by the Bureau of Animal Industry there are frequent analyses made of the urines from experimental animals. This has been done as a matter of clinical routine for several years and a considerable mass of data has accumulated. Much of this refers to normal animals. Inasmuch as the literature on the subject of the constants of normal urine from the sheep is meager, it was thought that the recording of these data in this place, where it would be available to those engaged in animal experimentation, would be interesting and important.

Table 1 contains the results obtained from the analysis of 28 samples of urine from normal sheep. The specimens were all obtained at the experiment station at Salina, Utah, maintained for the study of stock-poisoning plants. The sheep were ordinary range animals and were kept under range conditions as far as the nature of the experiments permitted. The alti-

tude of the station is nearly 8,000 feet, and all the animals used were completely accustomed to this altitude when the samples were taken.

The method of obtaining the samples of urine is as follows: The sheep is usually fed a ration of alfalfa hay in the morning and is then put in a metabolism cage and kept there for exactly 24 hours. The cage is large enough so that the animal may move about to some degree and may lie down comfortably. The floor is formed of a heavy wire screen of about $\frac{1}{4}$ -inch mesh under which is a finer screen of about No. 12 mesh. Below this is a galvanized-iron bottom which slopes to a central drain emptying into a screened pipe, and this conducts the urine into a vessel placed to receive it. In spite of the precautions taken, the urine was always contaminated with small amounts of feces. This contamination, however, was never great enough to vitiate the results. The main objection to this method of collecting samples of urine is due to evaporation. Measures to reduce this to the smallest practicable degree were taken, and it is believed that the error due to evaporation was smaller than the errors inherent in the analytical processes, and did not, therefore, affect the results.

As soon as the 24-hour collection period was at an end the urine was thoroughly mixed if, as frequently happened, it was collected in several fractions. A sample was then filtered for analysis, and the analysis was always completed within 12 hours. The color and odor were recorded and the reaction to litmus was determined. The specific gravity was determined with a smaller urinometer, and the routine tests for sugars, albumens, biliary constituents, etc., were made. The urea was quantitatively determined by the alkaline hypobromite method and the liberated nitrogen was measured in a Doremus ureometer. This last method is known to give high results for the urea in human urines and the fact probably holds true also for the urine from animals, but it is accurate enough for clinical purposes. The figures given for urea in Table 1 refer to the total urea excreted in the 24-hour period.

The results obtained were of great interest. Table 2 contains the averages as well as the maxima and minima of the data. Four of these figures are due to the case of Sheep 554, analysis of August 11, 1920. A sample of urine from this animal had also been obtained on August 9 and the results of the analysis

TABLE 1

Date	Sheep No.	Weight (pounds)	Age (years)	Sex	Volume (milliliters)	Specific gravity	Reaction	Total Urea (grams)
1918								
Aug. 24...	469	104	1	Ewe	1,704	1.019	Alkaline	43.78
Sept. 6...	503	93	1	do.	1,525	1.018	do.	32.83
Aug. 28...	472	95.5	1	do.	645	1.029	do.	22.11
Sept. 10...	492	111		do.	760	1.043	do.	35.85
11...	506	124		do.	1,770	1.033	do.	63.89
1920								
July 17...	582	106.25	4	do.	250	1.048	do.	28.00
19...	587	87	1	do.	960	1.017	do.	29.58
26...	600	86.5	1	Wether	930	1.020	do.	36.32
31...	563	101	1	Ewe	109	1.051	do.	10.68
Aug. 1...	605	97	1	Wether	515	1.057	do.	30.58
4...	578	97	1	Ewe	890	1.016	do.	27.42
7...	566	89	1	do.	262	1.032	do.	11.76
9...	554	127	1	do.	515	1.041	do.	41.53
11...	554	127	1	do.	75	1.057	do.	7.45
12...	575	68	1	do.	480	1.030	do.	22.04
16...	579	98	1	do.	985	1.027	do.	26.72
20...	581	74.5	1	do.	435	1.030	do.	32.29
26...	585	85	1	do.	665	1.029	do.	33.90
28...	587	96	1	do.	945	1.020	do.	34.49
29...	590	103.5	1	Wether	870	1.021	do.	27.29
30...	588	105	1	do.	750	1.023	do.	32.48
Sept. 4...	600	94	1	do.	1,110	1.024	do.	35.27
6...	597	98	1	Ewe	400	1.049	do.	24.75
7...	598	120.5	1	do.	815	1.038	do.	25.21
8...	594	114	1	do.	1,115	1.021	do.	37.29
1921								
Sept. 14...	646	118.5	4	do.	1,675	1.018	F. acid	46.45
16...	627	110.5	1	do.	950	1.035	Alkaline	31.61
18...	613	126.75	1	do.	780	1.020	do.	35.98
Average...					810	1.031		31.16

TABLE 2

	Volume (milliliters)	Specific gravity	Urea (grams)
Maximum.....	1,770	1.057	63.89
Minimum.....	75	1.017	7.45
Average (28 samples).....	810	1.031	31.16

are also given in Table 1. There is no reason to suppose that the animal was at all abnormal when these samples were taken, and the variation simply shows the lack of constancy which animals may exhibit.

In reaction the samples were with one exception alkaline, and generally the degree of alkalinity was smaller in the cases of large volume excretion. In only one case was the urine acid, and in this case the degree of acidity was very small. Substances which reduce Fehling's solution were absent in every case. In one case only was evidence of albumen obtained, and then it was in traces only. In several cases a detailed search was made for acetone bodies, with negative results. The general impression that herbivora excrete very small amounts only

of phosphates in the urine was confirmed in a number of the samples.

The writer desires to acknowledge his indebtedness to Dr. C. D. Marsh for suggestions and criticism and to Mr. A. B. Clawson for extensive assistance in collecting the samples.

NOTES ON PARASITES

By GERARD DIKMANS

Louisiana State University, Baton Rouge, Louisiana

IN THE COURSE of the last month the writer had occasion to make an examination of the intestines of some sheep, killed at the local abattoir, for parasites. The number of sheep killed here is comparatively small, and it behooves us, therefore, to take advantage of all the material that is offered.

PARASITES FOUND IN SHEEP

On examination in the laboratory of the material collected, there were found numerous specimens of *Hæmonchus contortus* (stomach worm), *Bunostomum trigonocephalum* (hookworm), *Æsophagostomum columbianum* (nodular worm), *Trichuris ovis* (whipworm), and a great mass of tapeworms.

The genus *Cooperia* was represented by three species, viz., *Cooperia curticei*, *C. punctata*, and *C. pectinata*. Two of these, *C. punctata* and *C. pectinata*, have been reported as parasites of cattle, but the writer is unaware of any record of their having been found in sheep. In B. A. I. Bulletin 127 Ransom has described and figured both of these species, so that any further description appears unnecessary. The writer wishes, however, to call attention to the prominent dorsoventral curvature of the spicules of the male *C. pectinata*. This feature, which is very conspicuous on microscopic examination, seems to have escaped Ransom's notice, and is not mentioned in his description. At the end of his description Ransom states: "This species has been collected but once, a few specimens being present among some nematodes taken from the fourth stomach of a Texas cow."

It may be of interest to note that this nematode is of frequent occurrence in calves slaughtered at the local abattoir here.

The following additions should, therefore, be made to the published descriptions:

Cooperia punctata: Hosts, cattle and sheep.

Cooperia pectinata: Hosts, cattle and sheep. Location, fourth stomach and small intestine. Locality collected, Texas and Louisiana.

FLUKES IN DOGS

On March 28, 1922, three dogs were destroyed at the laboratory, and their internal organs examined for parasites. The material collected contained four small flukes from the small intestines. Dog No. 1 contained one fluke. Dog No. 3 contained three flukes. These flukes were identified by Dr. Hall as *Alaria americana*. The species was first described by Hall and Wigdor (JOUR. AMER. VET. MED. ASSOC., vol. 6 (n. s.), No. 5, pp. 616-626, Aug., 1918). The authors recorded its occurrence at Detroit, Michigan.

This record should be amplified and the localities stated as Detroit, Michigan, and Baton Rouge, Louisiana.

A CYSTIC-NODULAR CONDITION IN AUSTRALIAN CATTLE, DUE TO A NEMATODE WORM, *ONCHOCERCA GIBSONI*

By E. M. NIGHBERT

Veterinary Inspector, United States Bureau of Animal Industry, London, England

THROUGH the courtesy of Dr. Cherry, representing the Australian Government in veterinary matters at London, England, I forward a photograph which shows the effect in cattle caused by parasitic invasion of *Onchocerca gibsoni*.

This parasite is a hair-like worm reaching the enormous length of 40 inches. It finds its resting place locally in the region of the brisket, stifle and outer side of the hind quarter. Its invasion of the subcutaneous tissues gives rise to cystic-nodular formation, showing prominently in the dressed carcass; therefore, it is of importance in connection with meat inspection and economically from the standpoint of the sale and use of fresh beef. In Australian literature the condition is referred to as "worm nests," "worm nodules," etc. Each nodule ranges in size from a split pea to an average-sized marble, and the nodules appear in the host animal in nest formation.

In the photograph the excision of these nests has been ac-



Australian beef carcasses showing effect of removal of worm nests

completed in the region of the stifle; also it will be noted that the affected brisket has been removed. From one to fifty or a hundred cysts may be found in one animal, always assembled in the areas named. I was informed that the cysts are generally easily removed, without as much mutilation of the parts as the pictures indicate.

So far, it appears, the exact mode of transmission of this parasite to cattle has not been determined. However, a biting

fly and mosquitoes of a certain variety are strongly indicated. This condition of cattle seems to be confined to, or at least originated in, cattle reared on Wilson Island in Northern Australia.

The general health of the host animal is not impaired. The condition has no connection with any disease in man; therefore the flesh is safe for food.

I had the privilege of personally examining a number of affected carcasses in London.

CAESAREAN SECTION IN BITCH WITH NINETEEN PUPS

By H. MEADE HAMILTON

Muncie, Ind.



Subject: Shepherd Police dog.

History: Twelve hours labor, with delivery of three puppies. Two weeks premature.

Symptoms or condition: Bitch had very feeble or practically no expulsive power, could not lie down on account of extreme size and too weak to stand, could only sit down in dog fashion. Pups delivered were dead, but well developed and normal except dropsy of allantoic fluids.

Treatment: Although the bitch had delivered three pups there was no apparent

reduction in her size, and due to her extreme weakness and enormous size, I advised the owner that I believed an operation would be the only possible means of saving her and that the prognosis would be unfavorable.

Everything being in readiness, with the animal having one-half grain morphine three-quarters of an hour before, we proceeded to operate at 9:15 p. m., June 9, 1922. Ether was used

as a general anesthetic, taking very little of it to produce surgical anesthesia.

Strict asepsis was followed throughout the entire operation.

It was necessary to open both cornua of the uterus. The operation was finished and the bitch made comfortable. I then proceeded to count the number of pups, which I will say was so great that I could not keep count at the time of removing them. The number was sixteen besides the three delivered naturally before the operation, making nineteen well-developed, normal pups in all.

The bitch was given 5 c.c. of camphorated oil before the operation and 5 c.c. following the operation. I also gave 15 c.c. of flavisol in the peritoneal cavity, following the next day with the same amount, and 5 c.c. of camphorated oil three times a day the same day. The animal was allowed some light food June 10, which she took, but she was very weak and could not stand alone. Improvement, however, was rapid and the bitch made a complete recovery in ten days.

Immediately following the above operation, I operated on a small white poodle bitch, which had been in labor for four days. This bitch had one pup, and it lay with hind quarters in one cornu and head in the other, with front feet in body of uterus and pelvic cavity. The fetal membranes were completely sloughed away, with the characteristic greenish discharge present. This bitch made a complete recovery and is doing fine at present writing.

A CASE IN CANINE PRACTICE

By G. W. BROWNING

Mobile, Alabama

EARLY in the morning of May 27 Mr. T. brought a two-months'-old Bull puppy to my office for treatment; said the pup had kept the family awake by his howling for the past two nights, and had not eaten a thing since the 25th. I watched him a few minutes and noticed that he would hump up his back and try to defecate every few minutes, and he kept yelping and howling every few seconds, showing the most excruciating pain somewhere. He kept up this periodical howling all day the 27th and until about 3 p. m. of the 28th.

I diagnosed the case as acute toxic gastroenteritis with impaction of the bowels, as they had been feeding him as an old dog should have been fed. I first gave him a gastrohepatic pill to endeavor to move his bowels, and followed this with enemas to try to hasten an operation, for I saw that he must have relief soon or die.

After six hours he vomited up the pills, which were dissolved. No operation and no better. He made so much noise that the neighbors near by could not sleep and were going to have my hospital condemned.

At 3 p. m. he was no better, still howling and shifting around. The owner came in and said: "I think a good deal of that pup and value him very highly, but I am tired of seeing him suffer so much, and I want you to chloroform him." I told him to let me try my old stand-by, and then if he did not get an operation of his bowels and stop yelling I would chloroform him.

I loaded my hypodermic syringe with 1/60 grain of lobelin and gave him a shot. He keeled over with a spasm and lay for a few seconds like dead. The owner said, "He won't need the chloroform now, for he is dead." But in a few seconds he got up, staggered around a while, and finally lay down and slept most of the time until the morning of the 29th, with no more howling. He had an operation of the bowels about 8 p. m. the 28th, of very hard feces rolled up with worms. No appetite yet.

The morning of the 29th he was lying in his box like a dead puppy, and I had about decided that the end was near, for he had been sick so long and had gone five days without eating anything. I went into my office and got my cone and chloroform to end the scene, but to my surprise I met him coming to meet me, with his tail up over his back as if nothing had happened. He appeared from his manners to be nearly starved. I gave him some milk instead of the chloroform. He licked it up in a hurry and wanted more. I restricted his diet for 24 hours, and he made a nice recovery.

Remarks.—We never get too old to learn. I had long abandoned routine treatment in my practice as much as possible, but where I made my mistake in this case was by not giving the lobelin first and emptying out the stomach. Then he would have retained the pill and assisted the pill through relaxation of the system, which I have proved in a few cases since that

time. If I had given the lobelin first in this case I would have saved at least two days' howling and been on better terms with my neighbors.

OBTURATOR PARALYSIS

By C. J. MARSHALL,

University of Pennsylvania, Philadelphia, Pa.

THE SUBJECT was a Holstein cow eight years old in good physical condition. Calved in a box stall Sunday night without assistance. Monday morning a normal, healthy calf was found but the dam was unable to get up. Was seen by the Ambulatory Clinic the following Tuesday. A fracture of the pelvis was suspected. There was no crepitation and a rectal examination revealed nothing abnormal. An unsuccessful effort was made to get the animal on her feet. The cow made an effort to get up but would assume the position of a frog with the hind legs strongly abducted. A diagnosis of obturator paralysis was made from the fact that the case appeared unable to adduct the legs. The legs were tied together with ropes and another unsuccessful effort was made to get her on her feet. Tincture of nux vomica prescribed and instructions left for trying to lift her with ropes each day. The cow could turn from side to side without assistance. We saw her one week later and found no improvement; was still unable to get on her feet even with assistance and had lost weight rapidly. Several bed sores had developed around the knees, hips and stifle joints. The animal was destroyed to prevent further suffering.

The autopsy findings showed a well marked lesion in each obturator nerve on the floor of the pelvis at the border of the foramen. The lesion of the nerve at these points was about three times the thickness of the normal nerve and practically one inch in length. There was a gelatinous mass around the enlarged portions. These cases are sometimes spoken of as straddlers and are seen quite often in stockyards where fresh cows or heavy springers are handled.

We believe this case might have recovered if treatment had been given sooner.

When the exposed condition of the obturator nerve is considered, it is surprising that it is not more frequently injured in difficult or even normal parturition.—*U. of P. Bulletin, Veterinary Extension Quarterly, No. 6, April 1, 1922.*

ABSTRACTS

NOTES ON TREATING MASTITIS WITH FORMALIN. A Savage. *Veterinary Journal*, vol. 78 (1922), No. 5, p. 174.

Savage recommends internal medication with formalin in one-ounce doses twice daily for sows as large as or larger than the average Ayrshire. The formalin may be given in a capsule or as a drench in a quart of very cold water. The formalin treatment should be supplemented by a brisk saline purge and repeated massaging of the udder and stripping of its milk many times daily.

The formalin treatment will not reduce an indurated quarter nor prevent abscess formation when that process is under way. In chronic cases it is not so useful as in acute forms of the disease. It is most successful when applied early and thoroughly.

L. T. GILTNER.

JOHNE'S DISEASE AND ITS DETECTION. B. A. Beach and E. G. Hastings. *Jour. Infect. Diseases*, vol. 30 (1922), No. 1, pp. 68-79. (Abst. in *Expt. Sta. Record*, vol. 46, p. 682.)

Following a brief discussion of the nature and distribution of Johne's disease, a report is given of an investigation of the disease at the Wisconsin Station, including attempts at isolation of the organism, the preparation of diagnostic johnin, its application in a number of herds, and the confirmation of the test by constitutional reactions, retests on reacting animals, and macroscopic and microscopic postmortem examination of reactors.

In one herd, which was known to have been infected for 14 years previous to the time the work was begun, 7 tests were made at intervals of from 3 to 6 months from June, 1917, to December, 1920. The number of reactors found in the successive tests were 5, 4, 6, 3, 4, 4, and 2. On repeating the test in June, 1921, no reactors were found, but it is not deemed at all certain that additional reactors will not be found in future tests. The specific organism was found in all but 1 of the 28 animals reacting to johnin, thus showing the reliability of the test when positive.

Observations of the spread of the disease in several herds in-

dicate that the disease at times spreads very rapidly and at other times very slowly.

RELAPSING FEVER IN PANAMA: THE HUMAN TICK, *ORNITHODOROS TALAJE*, DEMONSTRATED TO BE THE TRANSMITTING AGENT OF RELAPSING FEVER IN PANAMA BY HUMAN EXPERIMENTATION. L. B. Bates, L. H. Dunn and J. H. St. John. Amer. Jour. Trop. Med., vol 1. (1921), No. 4, pp. 183-210. (Abst. in Expt. Sta. Record, vol. 46, p. 682.)

This is a report of investigations conducted by the authors at the Board of Health Laboratory and Ancon Hospital, Canal Zone.

In the course of the work two white rats were infected with relapsing fever by inoculating them with a suspension of macerated naturally infected *O. talaje* ticks. Typical spirochetes were found in naturally infected ticks in Panama. One *Macacus rhesus* monkey was infected with relapsing fever of Panama by feeding a number of *O. talaje* larvæ upon an infected white rat, and 22 days later allowing the same ticks as first stage nymphs to feed upon the monkey.

Three human volunteer patients were infected with relapsing fever, as follows: "The first by a subcutaneous injection of blood from a white rat which had been infected with relapsing fever by a combined subcutaneous and intraperitoneal injection of naturally infected ticks, the second by a hypodermic injection of a suspension of naturally infected ticks, and the third through the bite of naturally infected ticks." Thus it has been proved by human experimentation that *O. talaje* transmits the causative agent of relapsing fever in Panama.

Dr. and Mrs. George A. Roberts have arrived in the United States after a five-year residence in Brazil, where the doctor had a contract with the State of Sao Paulo. Their present home is at Rock Hill, South Carolina.

Dr. Wm. M. Bell, of Nashville, Tenn., states that "the most important procedure in the treatment of tetanus, is the thorough dissection of all devitalized and infected tissues at the seat of the primary infection. Go well around it and deep enough to be sure to get it all, and see what a difference."

ARMY VETERINARY SERVICE

CAPT. VULLIAMY DECORATED



Dr. H. F. Vulliamy

Dr. H. F. Vulliamy, of Donaldsonville, Louisiana, has just been awarded by the British War Office the Victory Medal and the British Service Medal.

Dr. Vulliamy joined the horse and mule transport service in 1914, and for three years and three months made voyages to England, Greece and Egypt. He was then offered a commission as first lieutenant in the Royal Army Veterinary Corps, and went to France, where he remained till after the armistice was signed.

He resigned his commission in 1920, having attained the rank of captain, and returned to the United States, and is now located in Donaldsonville, La.

The Doctor is a veteran of the Spanish-American War, and has crossed the "Herring Pond" forty-nine times, forty-one of his voyages having been made during the Great War. He made a splendid record in the transport service.

ARMY CALLS¹

By MAURICE C. HALL

Washington, D. C.

(Tune of "Smiles")

There's the "First Call" in the morning,
There's the call of "Taps" at night,
There's the "Sick Call," "Come and get your quinine!"
There's a call for "Column left" or "right,"

¹Written for the third annual dinner of the Helminthological Society of Washington.

There's the stirring call of "To the Colors,"
 There's the hateful sound of "Reveille,"
 But the good old "Mess Call," "Come and get it!"
 Is the call that appeals to me!

(Tune of "Reveille")

I can't get 'em out!
 I can't get 'em out!
 I can't get 'em out in the morning!
 I can't get 'em out!
 I can't get 'em out!
 I can't get 'em out at all!

The tapeworm's worse than the ascarid,
 The pinworm's worse than the tapeworm,
 The hookworm's worse than the pinworm,
 And the lungworm's worst of all!

EPITAPHS TO HORSES

The old-time frontiersman's horse was close to his heart, and sometimes received the tribute of honorable burial when the end came, says *The Outlook* in a recent issue. Some of the inscriptions above the graves of these favorite horses, as quoted in "The Cowboy," by P. A. Rollins, tell the story with simple eloquence. Here are three:

JIM

a reel hors
 oct. 1, 82

HERE LIES
 "I'M HERE"

The Very Best of Cow Ponies,
 A Gallant Little Gentleman.
 Died on this Spot, Sept. 3, 1890.

HERE LIES
 "WHAT NEXT"

Born, 1886 at
 Died July 16, 1892, near Ft. Washakie, Wyo.
 He had the Body of a Horse,
 The Spirit of a Knight, and
 The Devotion of the Man who
 Erected This Stone.

In a belated announcement of honors bestowed by the Belgian Government for service during the war are the names of fifteen army veterinarians decorated with the war cross with palm "for courage and devotion of which they gave proof in the course of their long presence at the front."

ASSOCIATION NEWS

A. V. M. A. CONVENTION

The program for the fifty-ninth annual meeting of the American Veterinary Medical Association at St. Louis, Missouri, August 28 to September 1, 1922, so far as it has been completed, is given below.

MONDAY, AUGUST 28, 10 A. M.

Call to Order President A. T. Kinsley
Address of Welcome Governor Hyde
Response Dr. Tait Butler
President's Address Dr. A. T. Kinsley
Presentation and adoption of minutes.

MONDAY, 1:30 P. M.

General Session

Report of Executive Board.
Election of New Members.
Report of Secretary.
Report of Treasurer.
Report of Salmon Memorial Fund Committee.
New Business.

MONDAY EVENING

President's Reception, 8 to 9.
Dancing, 9 to 12.

TUESDAY, AUGUST 29, 9:30 A. M.

Section Meetings

Section on General Practice.
Section on Sanitary Science and Police.
Section on Education and Research.

TUESDAY, 1:30 P. M.

General Session

Report of Executive Board.
Election of Officers.
Report of Committee on Closer Affiliation with State and Local Associations.
Unfinished Business.
New Business.

TUESDAY EVENING

Meetings of College Alumni, Clubs and Associations.

WEDNESDAY, AUGUST 30, 10 A. M. AND 1:30 P. M.

Clinics at East St. Louis.

WEDNESDAY, 8 P. M.

Smoker and Round Table, Planters Hotel.

THURSDAY, AUGUST 31, 10 A. M. AND 1:30 P. M.

Clinics at East St. Louis.

THURSDAY, AUGUST 31, 8 P. M.

General Session, Planters Hotel.

Address, "The Veterinarian's Relation to Agriculture," Hon. Clarence Ousley, Fort Worth, Texas.

Address, "The Change in Veterinary Practice," Dr. W. B. Welch, Lexington, Ill.

Address, "Relation of the Veterinarian to the Public," Dr. Tait Butler, Memphis, Tenn.

FRIDAY, SEPTEMBER 1, 9 A. M.

General Session

Address, "The Present Status and the Future of the Veterinary Profession in Various European Countries," Dr. A. Eichhorn, Pearl River, N. Y.

Address, "The Present Status of the Army Veterinary Corps, Including the Reserve Corps," by a representative of the Veterinary Corps, U. S. Army.

Address, "Present Problems in Our Animal Industry," Dr. J. R. Mohler, Washington, D. C.

FRIDAY, 1:30 P. M.

Report of Executive Board.

Reports of Committees.

Unfinished Business.

SECTION ON SANITARY SCIENCE AND POLICE

First Session

Chairman's Address Dr. R. C. Reed, College Park, Md.

Secretary's Report..... Dr. H. Preston Hoskins, Detroit, Mich.

Observations on the So-called Hog "Flu".....

Dr. M. Dorset, C. N. McBryde and W. B. Niles, Bureau of Animal Industry, Washington, D. C.

Equine Infectious Anemia.....

Capt. R. A. Kelser, Army Medical School, Washington, D. C.

The Control of Equine Infectious Abortion in the United States

Army

Capt. George H. Koon and Capt. R. A. Kelser, Veterinary Corps, U. S. Army.

The Value of Animal Experimentation to Veterinary Medicine.....

Drs. J. G. Hardenbergh and S. D. Brimhall, The Mayo Clinic, Rochester, Minn.

Second Session

Tuberculosis in Its Relation to the Feeding and Marketing of Livestock

Prof. H. R. Smith, Live Stock Commissioner, Union Stock Yards, Chicago, Ill.

Facts and Interpretations Relating to Infectious Abortion in Cattle and Swine.....

Dr. J. W. Connaway, Columbia, Mo.

Election of Section Officers.

SECTION ON EDUCATION AND RESEARCH

First Session

Chairman's Address

Dr. F. W. Chamberlain, Michigan Agricultural College, East Lansing, Michigan.

Secretary's Report

Dr. Leonard W. Goss, Ohio State University, Columbus, Ohio

- The Role of the Udder and Its Secretions in Bovine Infectious Abortion
 Drs. W. Giltner, I. F. Huddleson and R. L. Tweed, Michigan Agricultural College, East Lansing, Mich.
- Preliminary Report on the Differentiation of the Various Organisms Belonging to the Hemorrhagic Septicemia Group.....
 Drs. C. P. Fitch and E. N. Nelson, University of Minnesota, St. Paul, Minn.
- The Character and Possible Significance of the Bang Abortion Bacillus that Attacks Swine.....
 Dr. W. E. Cotton, B. A. I. Experiment Station, Washington, D. C.
- Investigations on the Immunology of Swine Plague.....
 Drs. R. R. Birch and J. W. Benner, New York State Veterinary College, Ithaca, N. Y.

Second Session

- The Veterinary Curriculum: Some Suggested Changes.....
 Dr. V. A. Moore, New York State Veterinary College, Ithaca, N. Y. Discussion by Drs. D. S. White, C. H. Stange and L. A. Klein.
- Some Attempts to Control Strongyles in Aneurisms by Means of Intravenous Injections of Drugs.....
 Drs. Maurice C. Hall and Jacob E. Shillinger, B. A. I. Zoological Division, Washington, D. C.
- Studies in the Tuberculosis Complement-Fixation Test of Cattle.....
 Drs. John A. Kolmer, Dermatological Laboratories, and Fred Boerner, Jr., Pennsylvania B. A. I., Philadelphia, Pa.
- Investigations of Hemorrhagic Septicemia in Swine.....
 Dr. A. F. Schalk, Agricultural College, North Dakota.
- Election of Section Officers.

SECTION ON GENERAL PRACTICE

(Partial Program)

- Vaccination for Hog Cholera from a Practitioner's Standpoint.....
 Dr. George A. Young, Syracuse, Nebr.
- Dystocia in the Bitch.....
 Dr. F. O. Killian, St. Louis, Mo.
- The Handling of Fistula of the Withers in Practice.....
 Dr. B. W. Conrad, Sabetha, Kans.
- Dispensing as an Asset to the Veterinary Practitioner.....
 Dr. Charles W. Bower, Topeka, Kans.
- Some Important Points Concerning Mastitis.....
 Dr. Louis A. Klein, Philadelphia, Pa.
- Pathology of Sterility. (Illustrated.).....
 Dr. W. L. Boyd, St. Paul, Minn.
- Why the Practicing Veterinarian Should Be Recognized and Appreciated by the State and Federal Officials.....
 Dr. J. C. Ferneyhough, Richmond, Va.
- Some Practical Experiments with Necrotic Enteritis in Swine.....
 Dr. C. H. Honeywell, Slater, Mo.
- An Accredited Herd Plan of Value to the Practitioner.....
 Dr. D. H. Udall, Ithaca, N. Y.
- The Acriflavine and Proflavine Preparations in Bovine Practice.....
 Dr. E. J. Frick, Manhattan, Kans.

SMALL-ANIMAL PRACTICE SESSION

- Gastroenteritis in Small Animals.....
 Dr. O. V. Brumley
- X-Ray in Canine Practice.....
 Dr. G. P. Frost
- Diseases of the Eye.....
 Dr. H. J. Milks
- Gastrointestinal Parasites of Dogs and Cats and Treatment for Removing These Parasites.....
 Dr. Maurice C. Hall
- Sequels of Canine Distemper.....
 Dr. W. E. Muldoon

Clinic

Abdominal Surgery Dr. W. G. Brock
 Microscopic Demonstration of Diseases of Dogs..... Dr. R. P. Marsteller
 Illustrated Talk and Practical Demonstration of Anesthesia for

Small Animals Dr. J. G. Hardenbergh

In addition to the foregoing there will be on exhibition a number of interesting cases that will be presented and lectures given by some of the best men available.

PROGRAM OF CLINICS

WEDNESDAY

8 to 9 a. m. Demonstration of Tuberculous Reactors.....
 Dr. D. F. Luckey
 9 to 10.30 a. m. Demonstration of Gravid and Pathological
 Uteri..... Dr. W. L. Boyd
 10.30 a. m. to 12 m. Sterility Demonstration.....
 Drs. DeVine, Boyd and Bem's
 1 to 2.30 p. m. Poultry Clinic..... Dr. B. F. Kaupp
 2.30 to 3.30 p. m. Sheep Clinic..... Dr. I. E. Newsom
 3.30 to 5 p. m. Parasites of Hogs and Sheep..... Dr. Maurice C. Hall

THURSDAY

8 to 9.30 a. m. Surgery of the Udder..... Dr. T. H. Ferguson
 9.30 a. m. to 12 m. Swine Diseases..... Dr. J. W. Joss
 1 to 2.30 p. m. Demonstration of Tuberculous Lesions from
 Slaughtered Reactors..... Dr. J. S. Jenison
 2.30 to 5 p. m. Nerve Blocking and Lameness Clinic in horses
 Dr. L. A. Merillat

RAILROAD ARRANGEMENTS FOR A. V. M. A. MEETING

Reduced rates of one and a half fare on the certificate plan have been granted by all railroads for the A. V. M. A. convention. Buy a ticket to St. Louis at the regular fare, but *be sure to get a certificate* (not a receipt) from the ticket agent. This certificate, when signed at St. Louis, will entitle the holder to the reduced rate for the return trip.

The Wabash has been selected as the official route and offers special accommodations. Special train leaves Chicago, Dearborn Station, Sunday, August 27, at 11:45 p. m. For particulars address Mr. John Maloney, Assistant General Passenger Agent, Wabash Railway Co., 144 South South Clark Street, Chicago, Ill.

THE CONVENTION CITY

A HAPPY CHOICE fixed upon St. Louis as the meeting place for the A. V. M. A. Although St. Louis is a large, modern city with a population of 780,000 (which the suburbs increase to over 1,000,000), and is largely given over to commerce and manufacture, it retains its charm as a place where the arts and sciences are cultivated, where time is found and facilities are provided for recreation, and where a friendly hospitality is in evidence.

The city occupies a water front of 19 miles on the great Mississippi River and extends back over an area of more than 60 square miles. It has regular streets that make it easy for the



Planters Hotel, A. V. M. A. Headquarters

visitor to get about. Its magnificent Forest Park, covering 1,400 acres, is the city's playground and the visitor's delight. The steamboats on the Father of Waters provide pleasant and interesting trips, reminiscent of earlier days. The Missouri Botanical Garden is the finest in the United States. The water filtration plant, representing an expenditure of \$30,000,000, is of recent construction and embodies

the most modern ideas. The educational facilities comprise two major universities, numerous smaller colleges, and a public school system with buildings whose architecture is not approached elsewhere in the United States. The shopping facilities are unexcelled. And last, but not least, St. Louis has two baseball teams that are putting up a stiff fight for leadership in their respective leagues.

The Planters Hotel, at Fourth and Pine Streets, in the heart of the downtown section, will be the headquarters and place of meeting of the convention. This well-known hostelry is one of the largest and best in the city, and we are assured of good service and accommodations at reasonable rates.

Forest Park is provided with excellent arrangements for camping for automobile tourists. There are shower baths and camp stoves and excellent ground for erecting tents. Those desiring to have camping space allotted to them should address Fred W. Pape, Park Commissioner, City Hall, St. Louis, Mo.

EASTERN STATES TUBERCULOSIS CONFERENCE

The tuberculosis conference which was held in the Hall of the House of Representatives, State Capitol, Hartford, Conn., on June 6, 7 and 8, 1922, brought together veterinary practitioners and representatives of the livestock industry, as well as State and Federal employees engaged in cooperative work in the States of New York, Pennsylvania, New Jersey, Maine, New Hampshire, Vermont, Massachusetts, Rhode Island and Connecticut. The attendance of more than 400 persons testified to the interest which tuberculosis eradication has aroused and it was generally stated that the conference was most fruitful in making clear various problems which confront those engaged in tuberculosis eradication.

Commissioner Whittlesey and the members of the Connecticut Veterinary Medical Association, who so ably assisted him, have every reason to feel proud of the results of their laborious work in arranging and carrying on the conference so successfully.

The conference was opened on Tuesday morning by the Hon. J. M. Whittlesey, Commissioner of Domestic Animals, Hartford, Conn., who in a few well-chosen remarks introduced Dr. John R. Mohler, Chief of the Bureau of Animal Industry, Washington, D. C., as presiding officer. Dr. Mohler in his address attributed the success of the tuberculosis eradication campaign to the cooperation between livestock owners, veterinarians, and sanitary officials throughout the country. He stated that there has probably been no vital public health work which has had more hearty support than the campaign for tuberculosis eradication. The work required the confidence of the public, he said, and demanded tact and diplomacy as well as technical skill. "The fact that so much progress has attended the campaign attests to the competence of the field forces working on the problem," declared Dr. Mohler.

The Hon. Everett J. Lake, Governor of Connecticut, in his

address of welcome said: "It has been one of the great privileges of my administration to call a conference of this kind. I am proud of the privilege of backing up this State department to the extent of my ability for conserving the public health and the public weal through the elimination of bovine tuberculosis." He paid high tribute to Commissioner Whittlesey, and stated that the work of tuberculosis eradication was being conducted on sound, conservative lines.

Dr. C. S. Cheney, President of the Connecticut Veterinary Medical Association, responded to Governor Lake's address.

The object of the conference was stated by Dr. Mohler and its importance shown from the fact that the area covered contains one-twelfth of the bovine population and approximately one-fifth of the tuberculous cattle of the country. Stress was laid on the importance of sanitary measures in the prevention of reinfection.

A report of progress of tuberculosis eradication was given by representatives from each State participating in the conference.

The Hon. H. M. Tucker, Chief, Division of Animal Industry, Maine, said that of cattle tested to date 2.7 per cent reacted. Cattle owners were cooperating willingly in the work.

Dr. A. S. Pierce read the report of Dr. L. H. Howard, Director of Animal Industry of Massachusetts. This State, although late in cooperating with the Federal Bureau of Animal Industry, he stated, was now progressing rapidly in the eradication of tuberculosis.

Hon. A. S. Felker, Commissioner of Agriculture, Concord, N. H., was unable to attend. His report was presented by Dr. R. W. Smith, State veterinarian of New Hampshire.

Dr. J. H. McNeil, Chief, Bureau of Animal Industry, Trenton, N. J., reported that 28 per cent of the herds tested in his State were found tuberculous. He outlined difficulties encountered in eradication work owing to conditions peculiar to parts of New Jersey. All of the certified dairies and State institution herds were fully accredited.

The Hon. Berne A. Pyrke, Commissioner of Agriculture, Albany, N. Y., reviewed the tuberculosis situation in New York State, and preferred to designate the work being done as tuberculosis control rather than tuberculosis eradication, since the high per cent of infection present and the large expenditure of money required successfully to suppress the disease made the

total elimination of tuberculosis from the State a remote possibility. He was greatly encouraged, however, by the results of area work just completed in Essex County, New York, and felt that this demonstration would have a stimulating effect on the progress of the tuberculosis campaign.

The Hon. E. S. Brigham, Commissioner of Agriculture, Montpelier, Vermont, spoke in a brief but enthusiastic manner of the progress of tuberculosis eradication in Vermont.

The Hon. John J. Dunn, Secretary of the State Board of Agriculture, Providence, R. I., discussed the work in Rhode Island.

The afternoon session was given over to veterinarians engaged in tuberculosis eradication. The discussion brought out much valuable information on various phases of the work.

"Accredited Herd Tuberculosis Eradication Work" was discussed by Dr. T. E. Munce, Harrisburg, Pa.; Dr. L. H. Adams, Montpelier, Vt.; Dr. R. W. Smith, Concord, N. H., and Dr. P. E. Quinn, Harrisburg, Pa.

The "Difficulties in Eradicating Tuberculosis in Herds When Infection is Long Established" was discussed by Dr. H. B. Leonard, Albany, N. Y.; Dr. A. J. DeFossett, Montpelier, Vt.; Dr. W. G. Middleton, Trenton, N. J., and Dr. G. E. Corwin, Hartford, Conn.

Dr. T. S. Rich, Lansing, Mich., spoke on "Area Tuberculosis Eradication Work." The subject was discussed by Dr. Elmer Lash, Washington, D. C.; Dr. E. A. Crossman, Boston, Mass.; Dr. J. B. Reidy, Augusta, Me., and Dr. E. T. Faulder, Harrisburg, Pa. Throughout the conference it was apparent that the area plan of eradication was considered the most effective method of dealing with tuberculosis.

The afternoon session closed with a presentation of the subject of "Avian Tuberculosis," by Dr. B. A. Gallagher, Bacteriologist, Bureau of Animal Industry, Washington, D. C.

The Tuesday evening session opened with an illustrated lecture by Dr. S. Sisson, Professor of Anatomy, College of Veterinary Medicine, Ohio State University, on "The Lymphatic System of the Cow as Related to Tuberculosis." The excellent illustrations showed among other things the large numbers of small obscure lymph glands which are not exposed by the usual post-mortem examination and which might serve as the seat

of tuberculosis lesions in reactor animals passed as no-lesion cases.

Prof. H. R. Smith, Live Stock Commissioner, Chicago, Ill., gave an interesting address. He pointed out that bovine tuberculosis is on the decline as shown by statistics from slaughtering establishments over the country, while tuberculosis in hogs is increasing. Since avian tuberculosis is very extensive in some States and hogs are quite susceptible to it, this might account for the latter animals showing a higher per cent of infection than formerly, he suggested.

Dr. J. A. Kiernan, Chief, Tuberculosis Eradication Division, Washington, D. C., entered into a lively discussion of some of the statements made by previous speakers. He held that the tuberculosis campaign was one of eradication and not control; that its success was apparent, and that progress would be made as fast as the livestock interests and the public generally supported the movement. Colored maps were employed by the speaker to show the prevalence of tuberculosis in the eastern States.

The Wednesday morning session was presided over by Dr. Stephen J. Maher, President of the Connecticut Tuberculosis Commission, as this session was devoted principally to addresses by prominent physicians on the relation of bovine tuberculosis to human medicine.

Dr. G. E. Corwin, Deputy Commissioner on Domestic Animals, Hartford, Conn., presented the subject "Tuberculin Testing" and Dr. E. C. Schroeder, Washington, D. C., followed with an address on "Some Facts Relative to Bovine Tuberculosis Eradication." In the discussion which ensued Dr. Watson of Ottawa, Canada, said that too little of the specialists' side of the tuberculosis question is usually given in comparison with the practical work. He thought that States should provide funds for research work. The importance of research work in the eradication of bovine tuberculosis was emphasized by others of the speakers. Mr. Frank Walker, Chairman of the Livestock Sanitary Board of Virginia and a breeder of pure-bred cattle, participated in the discussion.

Dr. David R. Lyman, Superintendent, Gaylord Farm Sanitarium, Wallingford, Conn., spoke on the "necessity of Protection from Infection of Bovine Tuberculosis in the Control of Tuberculosis in the Human." Specialists in human tuberculo-

sis were intensely interested in such conferences as the present one, he declared, since there is no doubt that man is susceptible to bovine tuberculosis. Investigators have reported that over 50 per cent of cases of tuberculosis in children under five years old are due to bovine infection, he said. In concluding he remarked: "It is far better that we sacrifice a great many cattle than that we risk the life of one child in this State."

Dr. Edward B. Hooker, President of the Hartford Tuberculosis Society, gave an interesting address on the "Prevention of Tuberculosis." He attributed much of the disease to lack of resistance on the part of the child as a result of undernourishment. "A large percentage of tuberculosis in adults is simply a development of tuberculosis acquired in childhood," he declared.

"We are expending this year in Connecticut approximately \$200,000 for the reduction of tuberculosis in cattle, and we are convinced that this work has resulted in considerable reduction in the case of bovine tuberculosis, particularly in children," said Dr. John T. Black, Commissioner, State Department of Health, Hartford, Conn., in presenting the subject, "Tuberculosis as a Health and Economic Problem." He hoped that statistics which he gave would convince the most skeptical that no better investment of public moneys can be made than the investment for tuberculosis eradication work.

Dr. Cole B. Gibson, Superintendent of the Undercliff Sanitarium, Meriden, Conn., gave an interesting talk on "Tuberculosis Sanitarium for Children at Meriden as guests of Dr.

The afternoon was spent in a visit to the Connecticut Tuberculosis Sanitarium for Children at Meriden as guests of Dr. Gibson.

Wednesday evening was devoted to a reception, banquet and dancing at the Hotel Bond. Dr. A. T. Gilyard, Vice President, Connecticut Veterinary Medical Association, was toastmaster. The speakers were Dr. Thos. E. Maloney, Fall River, Mass.; Dr. F. Torrance, Veterinary Director General, Ottawa, Canada; Dr. John R. Mohler, Chief, Bureau of Animal Industry, Washington, D. C.; Dr. J. A. Kiernan, Chief, Division of Tuberculosis Eradication, Washington, D. C., and the Hon. Jas. M. Whittlesey, Commissioner on Domestic Animals, Hartford, Conn.

Thursday was cattle breeders' and veterinary practitioners' day at the conference.

Mr. W. S. Martin, Plainfield, Vt., spoke highly of the tuberculosis campaign, declaring it economically sound, and stated that it was not only improving the breeds of livestock but also the public health.

Mr. D. H. McLaurey, Director of the Bureau of Animal Industry, Albany, N. Y., read an address prepared by Mr. A. A. Hartshorn, Hamilton, N. Y., on "Some Fundamentals for a Successful Tuberculosis Eradication Campaign." He said little progress in eradication had been achieved until the system of accrediting herds was instituted.

Mr. Joseph Alsop, Chairman, Connecticut Dairymen's Association, Avon, Conn., stated that he is firmly convinced that the work of tuberculosis eradication can advance only along lines of the general public demand. For this reason he believes, he said, that the condition in Connecticut is an exceedingly healthy one because the demands of the farmers for better control of bovine tuberculosis is greater than the State can at present fulfill.

Several other breeders gave impromptu talks in which the work of tuberculosis eradication was highly commended. One breeder told of his experience that in eliminating tuberculosis from the herd all his shy breeders had also been removed.

"How the Practitioner is Cooperating in the Movement to Eradicate Bovine Tuberculosis" was ably told by Dr. Thos. E. Maloney of Fall River, Mass. He stated that a means should be found to employ to a greater extent the services of practitioners in the work of tuberculosis eradication. A lively discussion followed, which brought out the various advantages and difficulties which beset the problem. Lack of sufficient appropriations and high cost of indemnities, it was pointed out, limited the amounts of testing which could be undertaken. Herds under supervision were being turned over to the practitioners as rapidly as possible, it was stated, and in some States the testing was several months behind the schedule owing to the inability of local practitioners to keep up with the demands being made upon them.

Among those who discussed the subject were Dr. Thos. Bland, Waterbury, Conn.; Dr. H. M. Lewis, Nashua, N. H.; Dr. E. H. Baneroff, Barre, Vt.; Dr. P. T. Keeley, Waterbury, Conn.; Dr. DeVine, Dr. Colton, Dr. Crossman, Dr. DeFossett, Mr. Cook, Secretary of the Jersey Cattle Association of Connecti-

cut; Mr. Walker, Chairman of the Live Stock Sanitary Board of Virginia; Commissioner Whittlesey of Connecticut, and Mr. Holt, Dairy and Food Commissioner of Connecticut.

Invitations for the 1923 conference were extended by Dr. Torrance for Canada and Dr. Smith for New Hampshire.

The session closed with the adoption of resolutions prepared by the advisory committee appointed by the presiding officer, Dr. Mohler. The members of the committee were Mr. Brigham, Chairman; Dr. Torrance, Mr. Whittlesey, Dr. McNeil and Dr. Crossman. The resolutions expressed appreciation for the interest which the Governor of Connecticut took in the conference, endorsed the work of tuberculosis eradication, and recommended that the proceedings of the conference be printed.

Thursday afternoon many members of the conference motored to the Model Dairy Farm upon invitation of Mr. Joseph Alsop, Avon, Conn.

A well-filled program for the entertainment of the ladies was carried out by Dr. Chas. L. Colton and his busy aids.

B. A. GALLAGHER, *Recorder*.

IDAHO VETERINARY MEDICAL ASSOCIATION

The second annual meeting of the Idaho Veterinary Medical Association, as scheduled, was held in the Chamber of Commerce rooms in Boise on May 11. All of the officers were present and also, with few exceptions, all of the standing committees, with a total attendance of forty-five veterinarians. The association now has a membership of fifty-two; fifteen new members were secured at this session.

The forenoon session, as indicated by the program and as presented, was of a broad, fraternal, educational nature, and was much appreciated by all.

Dr. Enoch A. Bryan, Idaho Commissioner of Education, formerly President of Washington State College, gave a splendid address on the rise and development of veterinary science, its present high standard and its extreme importance as a great humanitarian measure in its relation to public health and its economical value. Doctor Bryan also recognized the great progress in the status of the profession at this time in this State, and the splendid organization now existing.

Dr. F. W. Almond, M. D., State Medical Advisor, read a paper

on some points in the cooperation of the medical and veterinary professions in relation to public health. He emphasized the importance of the cooperation that should exist between the professions in relation to public health, discussing briefly some of the animal diseases transmissible to man, especially bovine tuberculosis.

Dr. L. P. McCalla, M. D., President of the "League for the Conservation of Public Health," expressed his appreciation of the opportunity to talk to our organization, outlining the purposes of the League and its work, which is wholly educational and seeks only to present information vitally necessary to the people in preventing diseases and conserving public health.

Dr. B. F. Taylor, Professor of Veterinary Science at the University of Idaho, read a paper on "The Relation of the Veterinary Department of the University of Idaho to the Animal Husbandry Students."

Dr. E. E. Wegner, Dean of the College of Veterinary Science of the Washington State College, gave a very interesting, instructive and encouraging impromptu address on veterinary science, its progress and development, and the high standard of its attainment, touching on the period of depression just gone through, with an optimistic view of the future. He also spoke of the diversity of the modern practice, taking in all classes of animals, and that veterinarians should give every attention and appreciate the new field of opportunity in poultry practice. His speech developed into a real "heart to heart" talk which was thoroughly appreciated and enjoyed by all.

The afternoon and evening sessions were devoted to the business of the association and the reading of papers, and discussion of subjects of a technical and scientific nature.

Papers on the following subjects were presented, and interesting and instructive discussion developed among the veterinarians present:

"Traumatic Pericarditis in the Cow," by Dr. S. E. Nelson.

"Canine Distemper," by Dr. W. R. Smith.

"Bovine Sterility and its Treatment," by Drs. Groom and McCoy of Twin Falls.

"Pitfalls of the Veterinarian," by Dr. J. H. Plank.

"Mastitis in the Cow," by Dr. F. H. Hostetler.

A full report of the proceedings of this meeting will be published and mailed to all members of the association.

Dr. W. A. Sullivan talked on "State and Federal Cooperation in Animal Disease Control and its Relation to the Practitioner," which was enthusiastically discussed by all.

Dr. A. G. Moore, of Ontario, Oreg., gave an account of a local occurrence of anthrax, which developed an interesting discussion, particularly from B. A. I. veterinarians, as an outbreak of this disease has never occurred in Idaho.

Dr. J. D. Adams, Resident Secretary for the A. V. M. A., made another earnest appeal to the veterinarians on the extreme importance of joining the American Association.

The President, Dr. R. B. Hurd, made a brief talk on the success of the convention, and commended the membership on the splendid attendance.

As there was no election of officers to be held at this session, after the report of the secretary and treasurer, and reports of committees were accepted and resolutions adopted, the meeting adjourned sine die.

J. D. ADAMS, *Secretary*.

COLORADO VETERINARY MEDICAL ASSOCIATION

The semi-annual meeting of the Colorado Veterinary Medical Association, consisting of a three-day session, was held at the Colorado Agricultural College at Fort Collins on June 1, 2 and 3. In the business session, the chief item for discussion was legislation, since the Colorado legislature will be in session before the next meeting of the association. The legislative committee was directed to prepare a bill, regulating the sale of tuberculin within the State. It was also directed to prepare a measure limiting to licensed veterinarians the sale of biological preparations capable of spreading disease.

On the question of the reorganization of the American Veterinary Medical Association and the unification of all veterinary organizations, a committee presented the following resolution, which was adopted.

Whereas there is apparent necessity for a larger organization of the veterinary profession, and

Whereas we believe the affairs of the American Veterinary Medical Association can be more equitably managed by initiating and giving representation to State and District associations, and

Whereas we believe this representation of these associations

will create a more democratic organization, capable through a greater interest by the practitioner, of accomplishing much for the profession through united action, and

Whereas all businesses and professions are progressing only in direct ratio to their efficient organization, and

Whereas there has already developed manifest interest in the necessity of reorganization through various associations, and represented at present by a special committee of the American Veterinary Medical Association.

NOW THEREFORE BE IT RESOLVED that the Colorado Veterinary Medical Association in convention assembled do hereby approve of the reorganization program as outlined by this committee to its fullest possibilities and lend our united support to its accomplishments at the next meeting of the A. V. M. A.

A. N. CARROLL and
R. F. BOURNE, *Committee.*

The antivivisectionists having prepared a bill to be initiated at the fall election, which would prohibit all experiments on animals, the following resolution on this subject was adopted:

Whereas an antivivisection bill has been presented to the people of Colorado, and

Whereas this bill would effectually stop all animal experimentation, and

Whereas we believe that it would prevent further research into either animal or human disease, and

Whereas we believe this bill, if it should become a law, would be very inimical to the livestock industry;

THEREFORE BE IT RESOLVED that we use our best efforts to defeat the bill and urge each one of our members to do likewise.

Under the title of "Antivivisection and Modern Medicine," Dr. G. W. Stiles, Bureau Pathologist at Denver, discussed the value that animal experimentation had been in the development of medicine. He pointed out that without animal experimentation, medicine would lapse into the dark ages.

Two instances of actinobacillosis, one a considerable outbreak, were discovered by Dr. E. E. Tobin. The diagnosis had been made at the Agricultural College. The inference was that this disease may be more common than we suspect.

The question of "Tuberculosis in Colorado" was discussed by Dr. B. F. Davis, State Veterinarian of Wyoming, and Dr. C. G. Lamb, State Veterinarian of Colorado. The immediate cause of this discussion was a recent quarantine promulgated by the Governor of Wyoming, which effectually prohibits the importation of dairy cattle from Colorado. It was pointed out

by Dr. Davis, in support of this quarantine regulation, that Colorado laws did not provide for the disposition of reacting animals and that in certain cases these tuberculous animals had found their way into Wyoming, thereby tending to spread the disease. He stated that whenever Colorado saw fit to pass a law which would effectually dispose of reactors, the State of Wyoming would be pleased to abate the quarantine. Dr. Lamb admitted the unfortunate conditions, but stated that under the existing statutes he was powerless to do otherwise at this time. The consensus of opinion seemed to be that while the Wyoming quarantine was somewhat drastic, yet Colorado had been negligent in properly handling its tuberculous animals, and that until such time as our laws could be amended on this subject we might expect such action as was taken by the State of Wyoming.

The subject of poultry diseases was efficiently handled by Dr. F. R. Beaudette, Poultry Pathologist of the Kansas Agricultural College. He not only covered the subject from a theoretical point of view, but also discussed a large number of clinical cases which were presented.

Dr. A. T. Kinsley, President of the A. V. M. A., discussed swine diseases, both from the theoretical and clinical standpoint:

Dr. R. F. Bourne presented a small pig, which had previously been fed eggs of *Ascaris lumbricoides*. The pig showed typical signs of thumps while alive, and the presence of pneumonia with many hemorrhages, following death. The larvae of the ascarid were demonstrated in the bronchial mucus. Dr. Bourne also showed the moving picture illustrating the life history of the ascarid of swine, which had been loaned by the U. S. Department of Agriculture for this purpose.

A considerable number of animals showing various genital diseases was exhibited and discussed by Dr. H. E. Kingman. A number of pathological specimens gathered at the packing houses in Denver were also discussed in connection with this phase of the clinic.

The annual banquet and ball, which are usual features of this meeting, were held at the new Women's Building at the Colorado Agricultural College on the evening of June 2.

I. E. NEWSOM, *Secretary*.

ARKANSAS VETERINARY ASSOCIATION

The semi-annual meeting of the Arkansas Veterinary Association was held at the Marion Hotel, Little Rock, on June 9. Those in attendance state that it was the most interesting and harmonious meeting that has been conducted in several years.

The address of welcome was given by Honorable Ben D. Brickhouse, Mayor of the City of Little Rock, who stated in part that the veterinary profession has a service to perform and that he had always favored the employment of veterinarians in municipal health work. The veterinarians were diplomatically criticized for their indifference, citing his own experience in that during his three years of office not a single veterinarian or veterinary association had suggested in any manner the importance or desirability of having a veterinarian engaged in conducting certain lines of municipal health work. He urged the importance of organization, stressed the importance of publicity through the various daily papers and agricultural publications by members of the profession furnishing articles or material. Mayor Brickhouse made many other timely and constructive suggestions, which space prevents mentioning.

Dr. W. A. McDonald, Inspector in Charge of Tick Eradication, in a few well-chosen remarks responded to the address of welcome.

Dr. D. F. Luckey, Livestock Commissioner, National Stock Yards, Illinois, delivered a stereopticon lecture on tuberculosis, which was very helpful and highly appreciated by all.

Dr. W. F. Miller, Stuttgart, being unable to attend, forwarded an excellent paper on "Municipal Testing Dairying Herds." He made a most emphatic statement that the control and eradication of tuberculosis are a social problem worthy of our most serious consideration. He adduced figures, showing that 3,000 human beings die annually from tuberculosis and that 25,000 people are totally or partially incapacitated by this disease in Arkansas, 10 per cent of the patients in one sanitarium at Denver being from Arkansas.

Dr. Earl Kittrell, Augusta, presented in a very able manner a paper entitled "Practice in the Field." He urged all the various forces engaged in encouraging poultry and stock raising to cooperate in promoting a common interest.

Dr. N. J. Hayes, Helena, read a very highly interesting paper

on "Rabies." He brought out some very fine points in differential diagnosis of this condition.

Dr. C. D. Stubbs, Assistant State Veterinarian, Little Rock, in a few well-chosen remarks gave his experience of some years' duration in the observance of the occurrence, dissemination and prevention of anthrax. This disease is highly feared in the infested districts, and he suggested that it is almost as important to treat the stock owners, in order to allay their fear, as it is the animals.

Dr. H. W. Wilson, Helena, has found that since the Arkansas razor-back has been replaced by the purebred animal, swine practice is adding considerable revenue to his yearly income. His paper discussed the "Caesarian Section of the Sow." The difficulty is in administering anesthesia in these cases without intelligent assistance; however, he has found that in emergencies this may be entrusted to some cool-headed farmer, with a minimum risk.

Dr. N. J. Pearce, Monticello, requested information regarding losses of horses and mules, which appeared to be due to buffalo gnats. It was disclosed that losses had been experienced from gnats this season in some eight or ten counties of Arkansas, being confined to the lowlands, losses probably being due to the injection of a toxin which deranged heart action, produced flatulence, which if not relieved results in ruptured stomach. No one reported losses of animals due to excessive inhalation of the gnats into the respiratory tract.

President Hubert Shull read some extracts of cures recommended in an English book published in 1678. Among other ludicrous treatments recommended, the following is an example for mad dog bite: "Take Hob-goblin, Periwinkle and Box leaves, each a handful, first mince them small, then stamp them very small in a Stone Mortor and with milk or beer administer it both at the change and full of the moon."

Dr. H. W. Wilson, Helena, was elected President; Earl Kittrell, Augusta, Vice President; Joe H. Bux, Little Rock, Secretary-Treasurer.

The next meeting will be held at Little Rock some time between October 9 and 15.

JOE H. BUX, *Secretary.*

COMMUNICATIONS

ST. JOSEPH VETERINARY COLLEGE COMMENCEMENT

TO THE EDITOR:—

I am enclosing you the program of our annual commencement, and would like to say that we had a very pleasant ending of the year. We served a banquet at the St. Francis Hotel on the night of the 16th to one hundred and fourteen. A number of good speeches by prominent men was greatly enjoyed and all retired feeling they had enjoyed a splendid social evening.

The commencement exercises were conducted in the college auditorium the evening of May 17. The attendance was good. Among other guests was Dr. A. T. Kinsley, President of the American Veterinary Medical Association. The chief features of the evening were a splendid address by Dr. John S. Koen of Bloomington, Ill., and some splendid singing by that standby in veterinary meetings, Dr. J. I. Gibson.

While our class was not as large this year as was desirable, the quality of students was good, and we feel that we did splendid work throughout the year. Nearly all of the graduates took the Missouri State Board Examination, and a member of the Board told me the evening following that all had passed.

Prospects for another year are quite encouraging; many inquiries are coming from various sources, and if times ease up so that prospective students can procure the necessary funds to defray expenses, I look for a much larger attendance than we have had in the past few years.

R. C. MOORE, *Former Dean.*

WISCONSIN BREEDERS APPROVE A. V. M. A. POLICY REGARDING FAKE REMEDIES

TO THE EDITOR:

Your support of our appeal for the discontinuance of traffic in false livestock remedies is appreciated. We are glad indeed to be able to anticipate the active support of the American Veterinary Medical Association in this movement. It is one in which stockmen have reason to be interested and veterinarians to be deeply concerned. The active support of such publications as the JOURNAL OF THE AMERICAN VETERINARY

MEDICAL ASSOCIATION, the *North American Veterinarian*, *The Breeders' Gazette*, *Hoard's Dairyman*, *Prairie Farmer*, *Chicago Daily Drivers' Journal*, *Wisconsin Agriculturist*, and *Wisconsin Farmer*, will help much in discouraging practitioners and other distributors in dealing in such so-called remedies.

The livestock industry in this and other States can continue to be a great source of prosperity if those charged with leadership appreciate their responsibility and conduct themselves accordingly.

Thanking you again for your support and encouragement,
we are,

Yours very truly,

E. H. PARKER,

President, Wisconsin Live Stock Breeders' Association.

NECROLOGY

Dr. Melville Thompson Seay, Assistant State Veterinarian at Clemson College, S. C., died in Columbia, S. C., from the effects of a wound received while in swimming in a lake near that city several days ago, tetanus having set in.

Dr. Seay was a graduate of the Washington, D. C., public schools, and was a lieutenant in the A. E. F. of the World War. He was a member of the American Legion and was born in Knoxville, Tenn.

DEATH CAMAS POISONOUS TO CATTLE

Death camas, of which there are four principal species in the range country of the West, although causing heaviest losses among sheep, are also poisonous to horses and cattle. Under range conditions cattle are seldom poisoned. Horses are frequently made sick, but deaths are rare. A few cases are known where persons have been fatally poisoned by the weed. Children have eaten the bulbs out of curiosity and adults have gathered the plant, mistaking it for the edible sego. No remedy has been found for poisoning by death camas.

American Swineherd says, "The Agricultural Department in digging after facts and truths, in making discoveries to advance the farmer's interest, with their endorsement guaranteeing the great superiority of purebred hogs over scrubs, is worth millions to the farmers of the U. S., if they use this knowledge for their benefit."



THE CITY THAT ONCE WAS A TRADING POST

By FRANCIS E. TURIN

St. Louis Convention, Publicity and Tourist Bureau

OVER a century and a half ago, Pierre Laclède Liguist, a Frenchman, to whom the Spanish Government had given a monopoly of the trade with the Indians, and his stepson, Auguste Chouteau, established their trading post and called it St. Louis. This was in 1764. The trading post soon grew into a village—the outpost of civilization.

The little village grew rapidly and soon was incorporated as a city, and now it is one of the leading cities of the United States and the metropolis of a great valley.

But little did Laclède and Chouteau think as they were working their way up earth's noble river, towing by manpower the boats that contained the supplies with which they started the construction of what is today one of the greatest American cities, that their St. Louis would one day be—

One of the greatest banking centers of the world;

The largest piston-ring city in the world;

The largest sugar-mill machinery manufacturing city in the world;

The largest fur market in the world;

The largest steel furnace manufacturing city in the world;

The largest horse and mule market in the world;

The largest hide and wool market in the world;

The largest shoe-distributing market in the United States;

The largest fabric-measuring machine manufacturers in the world;

The largest brick and clay products manufacturing center in the world;

The largest center for manufactured poultry and livestock feed;

The largest hardwood and pine market in the world;

The largest coffee market in the world;

The largest hardwood lumber market in the United States;

The largest millinery center in the United States;

The largest manufactory in the country of cotton and duck garments and uniforms;

The largest grain center in the United States;
The largest railway and street-car manufacturing center
in the United States;
The largest bag manufacturing center in the United
States;

And contain—

The largest house in the world for butchers' supplies and
packing-house machinery;
The largest terra cotta works in the world;
The largest drug house in the world;
The largest lead works in the world;
The largest hardware house and market in the world;
The largest rug house in the world;
The largest wholesale paper house;
The largest buggy factory;
The largest tobacco factory;
The largest bird cage ever built;
The largest and longest double-deck steel span bridge in
the world;
The largest plant in the United States for building
crushers and pulverizers;
The largest freight transfer company in the United
States;
The largest blowpipe factory in the United States;
The largest woodenware house in the world; and many
other "largest in the world."

It has long been said
that Missouri could build
a fence along her borders
and support her natives
without calling on the
outside for assistance.
Without a doubt particu-
lar care would be taken
to see to it that the fence
included the metropolis
of the State on the eastern
border—St. Louis.

Laclede and Chouteau
carried their banks on
their backs, or in their
canoes, and trade was
maintained with the In-
dians through gaudy trin-
kets, beads and whatnots,
as well as with the neces-
sities of life and luxuries



which had been brought from the eastern civilization. What a comparison with our modern business methods and banks.

The Government recognized the importance of the St. Louis district and not so long ago awarded a Federal Reserve and Federal Land Bank to the city. Through this award St. Louis became the only city in the United States with such Federal bank strength.

The strategic position occupied by St. Louis is better realized by the knowledge that it is just about midway between the center of population, a short distance east of St. Louis, and the geographical center of the United States, a short distance west of St. Louis. It is located on the Mississippi River, in the center of the Mississippi Valley, and is a railroad center of first importance, with 25 steam railroads and four electric lines, of which the Illinois Traction System is the largest, this latter also being the most important electric system in the United States.

By reason of its proximity to the geographical center of the United States, it necessarily follows that St. Louis can be more easily and more quickly reached from all parts of the United States than any other city, without a single exception.

St. Louis is modern in office buildings, hotels, beautiful parks, and has many of the first homes in the country, and at the same time is older than the United States and rich in romantic traditions.

The city spreads over 62½ square miles of territory and is within a night's ride of over 50,000,000 people.

Over 37 per cent of the city's inhabitants are home owners, and the residential districts of St. Louis are among the most beautiful in the United States.

The four bridges which span the Mississippi River at St. Louis, including the Municipal Free Bridge, which is the largest double-deck steel-span bridge in the world, are valuable assets and sights visitors should see. The Free Bridge and approach are two miles long.

Forest Park Highlands. "The Big Place on the Hill," is the Coney Island of St. Louis. The carnival spirit is always in existence at the Highlands and it is worth a visit for a night of fun.

St. Louis learned its lesson through the war. Close cooperation in war work taught the merchant, banker, manufacturer and business man that working together produces the right results, and St. Louis is always ready to turn out to make the visitor feel at home. The city has rightfully earned the reputation of being "the most hospitable city in the world," and the people of St. Louis work together to preserve the reputation.

Twenty-five railroads run through St. Louis to "every-

where," and the Mississippi offers opportunities for waterway transportation to Mississippi Valley points and gulf ports. The unusual combination of rail and water facilities without doubt make St. Louis the great central gateway to the Mississippi Valley, Middle West territory and the South and Southwest. The shipping facilities of the city extend in all directions with a clear sweep to the marts of the world and plainly indicate the supreme position held by St. Louis in the business of the nation.

The 124 grade schools, six public high schools, teacher's college and the junior high school offer additional pleasure to those who enjoy inspecting buildings of this character.

If you are a lover of the great outdoors you will be interested in the parks, of which there are over 2,700 acres. Forest Park, with its rolling woodlands, fast developing zoo; with the world's largest bird cage, municipal golf links and tennis courts that are artificially lighted, making them available for use at night as well as day, gridirons, baseball diamonds, soccer fields and the boats and canoes on the lagoons afford maximum opportunity for the enjoyment of outdoor sports. In this park you will find the Art Museum, which is the third finest in the country, as well as the Jefferson Memorial with its statue of Thomas Jefferson by Bitter. On Art Hill you will find the heroic statue of Saint Louis, by Niehaus, where at the base was enacted one of the most historic ceremonies in modern times when the French Legion, on its visit here, dipped its colors for the second time in history and honored St. Louis as no other city in the world has been honored.

If you are a golf player, the municipal eighteen-hole golf course at Forest Park is the best all-the-year-round golf course in the United States. There is also a nine-hole course, and a midnight sprinkling system is used so that the greens are not



wet for the early morning golfers. The course covers more than a mile from the east to the west and takes in the highest and lowest points in Forest Park. In addition to the municipal golf links there are many courses at various clubs. And if you journey out to Forest Park you should view the only municipal open-air theater in the world, where operas are shown to the delight of visitors to St. Louis and its citizens. The theater seats 10,000 people and is built entirely of concrete. The great stage is set in the natural woodlands of the park. Volumes have been written in paying tribute to St. Louis for its work along this line and you will do well to visualize the scene of activities.

Incidentally, while in St. Louis, if you have the time, pay a visit to the Old Court House, the oldest of St. Louis' public buildings, work on the building having been started in 1839 and completed in 1862 at a cost of about \$1,000,000. The building is considered by experts to be a splendid example of historical structure with fine architectural qualities and is located at Chestnut and Market streets, between Fourth street and Broadway, and is in the form of a Greek cross and of Doric order of architecture. The building was made historic by the slave sales which took place on its steps during the Civil War, and also the whipping post was located on this site during the early days of St. Louis. The magnificent frescoes in the dome were done by Carl Wimer, in 1862, a St. Louis artist of note, and they were restored by Edmund H. Wuerpfl during the World's Fair in St. Louis in 1904 and are again being restored at this time of writing.

The Missouri Botanical Garden (Shaw's Garden) is the second largest garden in the world; it is the largest in America. Only the Royal Gardens at Kew, England, excel it. The garden covers approximately 125 acres of ground, and collections from plant life of the world are cultivated by experts at one of Nature's beauty spots. The garden is one of the show places of St. Louis and visitors are always welcome.

The city that once was a trading post has gradually grown great in many things. Today St. Louis is a buying and fashion center, a leader among the world marts, in addition to claiming greatness in industrial development. The city actually rivals Paris in styles in various ready-to-wear lines.

St. Louis is a "home" city and its people are God-loving and God-fearing. The houses of worship here are distributed throughout the entire city and run the gamut from old and quaint to new, modern and splendid. The old Cathedral (Catholic) on Walnut street, between Second and Third streets, with its French inscriptions, is one of the historic structures of the city.

The New Cathedral (Catholic) on Lindell Boulevard, is not only the largest church building in the United States, but is also one of the finest. "Kingshighway," from one royal fort to another during the Spanish regime, and today one of the city's finest boulevards, is the show street of the churches of St. Louis. The Second Baptist, with its great campanile, is Italian Gothic; St. John's Methodist is neither pure Greek nor pure Roman, but belongs to the Italian Renaissance of the Fifteenth century; Temple Israel (Hebrew), with its great columns, is pure Corinthian, and the Christian Science is Italian Renaissance. At Thirteenth and Locust streets is the historic Christ Church Cathedral (Episcopal), containing masterpieces of stone carving. In this church are to be found the articles of association of the first Protestant Church west of the Mississippi River.

In conclusion, please remember that "the next best thing to living in St. Louis is to be a frequent visitor." So says our Mayor.

The 772,897 people of St. Louis, or the 1,250,000 people of this district, are glad that you selected St. Louis for your convention. Come often; come early and stay late.



AID FOR RUSSIAN VETERINARIANS

At an assembly of the Veterinary Surgeon's Section, held in Simbirsk, Russia, recently, the assembled veterinarians expressed their thanks to the American people for its gifts of corn, through the medium of Edward Fox, of Pottsville, Pa., Supervisor for the American Relief Administration in Simbirsk. During the meeting Mr. Fox and his assistants, Mr. Blonquist and Mr. Godfrey, were addressed by the president, Dr. Tourgevitich.

During his talk he mentioned the numerous benefits received by the starving Russian people of America, and expressed the thanks of all Russia for the help that had been extended to

them during the martyrdom of their nation. A translation of Dr. Tourgevitich's speech is printed below:

"I am welcoming you in the name of the whole association of veterinary surgeons of Simbirsk district, and am expressing our greatest thanks for the honor you are doing us in taking part in our assembly.

"It is a great pity that such an eminent day for us coincides with the difficult time we are passing through; but I am sure, dear guests, that your participation, and the good and generous heart of the American people coming to the help of the Russian martyrs, will give us new courage, energy, and force to vanquish the misfortunes that have fallen upon us.

"If the merits of the American people in regard to our country are great, so yours, dear friends, are immense. You are far from your country, separated from your relatives, and acquaintances dear to your hearts, and are passing through many difficulties in a starving country only to bring all possible help to the suffering Russian people.

"Such merits of the American people, and yours, dear guests, cannot be forgotten. They will remain forever in the hearts of the Russian martyrs and their descendants, and will be written in golden letters on the pages of Russian history."

DUTCH GUIANA QUARANTINES AGAINST BRAZILIAN CATTLE

A shipment of 55 cattle and 83 pigs arrived in Dutch Guiana from Brazil on May 5, 1922. Two days later they were found to be infected with rinderpest and were ordered destroyed by the Government. So far as is known the disease has not spread to any local cattle. As a result of this experience the Government of Dutch Guiana has prohibited the further importation of livestock from Brazil.

Dr. Stanton Youngberg, Chief Veterinarian of the Bureau of Agriculture, Philippine Islands, is visiting the United States on a ten-month accumulated leave of absence. He has been renewing old friendships in Ohio and North Carolina and will spend the month of August in Minnesota. Dr. Youngberg has been in the Philippines for the past fifteen years and has not been in the States for ten years.

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CONVENTION REPORT NEXT MONTH

THE A. V. M. A. fifty-ninth annual meeting is in session at St. Louis as this issue of the JOURNAL goes to its readers. There is every indication that the convention will be successful in attendance, program and entertainment. Our next number will contain a general report of the meeting as a whole, together with some of the papers. Other papers and the complete proceedings will follow from month to month as rapidly as possible. The fine quality and varied character of the program assure to our readers during the coming months some unusually instructive and interesting material bearing upon all phases of professional activity and interest.

The address of the retiring President, Dr. A. T. Kinsley, is published in this issue. It presents several matters of interest and importance to the Association and the profession in general and makes some good constructive suggestions. It merits careful reading and consideration.

DIVIDENDS FROM GOOD PUREBRED SIRES

LIVESTOCK is recognized as necessary to permanent well-balanced farming. But the astonishing differences in returns which domestic animals pay their owners is seldom realized,

except in experiments or other cases where good and inferior stock is kept at the same time and under similar conditions. Abundant evidence from such comparisons shows that the quality of sires at the head of herds and flocks determines in large degree the amount of returns. In addition the quality of live stock for many years to come depends on the kind of breeding animals used now.

Following are a few timely facts that show the value of carefully selecting breeding stock—especially sires:

Good dairy sires bred to average cows have increased the milk and butterfat production of the offspring by more than 50 per cent. The increase has been followed by additional gains in subsequent generations.

Beef sires of good quality when bred even to native cows produce steers of fair uniformity and market value. Good beef bulls are necessary for the production of rapidly maturing, meaty, blocky and profitable beeves.

A well-chosen purebred boar may be expected to add at least 10 per cent to the market weight of his offspring compared with hogs sired by an inferior boar and receiving the same care and feed. Besides, the better-bred hogs will be more uniform and of superior market value.

Good rams have increased wool production by more than 60 per cent and weight of lambs sired by them to the extent of 50 per cent.

In poultry the results of good breeding are especially pronounced owing to prolificacy and the short period required for maturity. In an average flock a standard-bred male of a meat breed will add fully one-fourth to the market weight of the first generation. In egg production a well selected pedigreed male may be expected to increase the yield of the first generation of pullets fully 50 per cent.

Simple calculations show that purebred sires pay liberal dividends even when the purchase price appears high to persons accustomed to scrub values. In brief, purebred sires excel those of grade or scrub breeding because they increase efficiency in live-stock production. To be sure there is considerable difference in quality among purebreds, but a small percentage of poor specimens must not be allowed to reflect discredit on the sound breeding principles of grading up. The scrub purebred must be eliminated along with other inferior sires. On the other hand, purebred males of high individual merit mean the establishment of better live stock both for the individual and the entire Nation. The use of inferior sires has been costing

farmers and stockmen of the United States fully a hundred million dollars a year—a loss which has no place in modern agriculture. Better sires mean better stock; better stock means better farms; and better farms mean a better clientèle for the veterinarian.

VITAMINS FOUND IN PORK

EVER SINCE the discovery of the presence in certain foods of those mysterious beneficial substances now known as vitamins, it has been thought that they were to be found in animal tissue most abundantly in certain of the internal organs, especially the heart, liver and kidneys, but the Bureau of Animal Industry now announces that they exist in the muscle fiber of beef, veal, mutton, lamb, and pork, and that pork is particularly well supplied with them.

Various cuts of the different kinds of meat were tried, and in every instance pork was found to be relatively rich in vitamins. Pork tenderloin, fresh ham, smoked ham, and pressed boiled ham were tested and the results were much the same with all of them. Beef and veal were relatively lower, while the amounts contained in lamb varied a great deal.

The experimental work consisted in feeding tests with rats and pigeons. Growth was the determining factor in the case of rats. In pigeons deficiency of vitamins was indicated by the development of polyneuritis, a disease to which they are peculiarly susceptible. Feeds rich in Vitamins are of great help in keeping them in health.

This new evidence on the distribution of vitamins in meats should not lead to the conclusion that certain meats are of low nutritive value because they are deficient in vitamins. Meat is one of our most important foods and would continue to be so even though it contained no vitamins.

ANTIS AGAIN ACTIVE

THE ANTIVIVISECTIONISTS are at it again—or yet. Undaunted by numerous and repeated failures to get legislation which will hamper scientific research to accord with their ideas, they are continuing their efforts in a number of States. In Colorado by means of the initiative an antivivisection bill will

come before the voters at the November election. Its provisions are similar to those of the measure that was defeated in California in 1920. If adopted it would abolish all experimental study of problems in general biology and in human and veterinary medicine; it would put a stop to modern diagnostic methods; it would prevent the preparation of vaccines and curative serums and the standardization of drugs by animal tests, and it would greatly impair the usefulness of several laboratories, including the branch pathological laboratory of the United States Bureau of Animal Industry at Denver.

In other States also—Louisiana, Florida, Idaho, Oregon, Washington and California—the antis are getting busy with similar propaganda. A sure way to defeat such efforts is to enlighten legislators and the public. Eternal vigilance is the price of liberty. Let us be vigilant.

MEDICAL ENGLISH AS SHE IS WROTE

“MEDICAL TERMINOLOGY has never distinguished itself by its exactitude, clarity and precision.” Beginning with this quotation from the German journal *Virchows Archiv*, the editor of the *Journal of the American Medical Association* in a recent issue proceeds to discuss the shortcomings of medical writers in the use of English. After taking a fling at the loose usage of “cirrhosis” and “apoplexy” the *Journal* continues:

“A difference between infectiousness and contagiousness seems not to exist in the minds of some writers, while others describe the inoculation of animals or patients with serum, as if inoculation and injection were synonyms. The distinction between tuberculous and tubercular is apparently too subtle for many, including writers of excellent repute, who seem to forget that if there exist such things as tubercular leprosy, tubercular syphilids, and normal anatomic tubercles of many sorts, then the words tubercle and tubercular can not possibly be understood to mean specifically infections with *Bacillus tuberculosis*, even if some of the lesions produced by this germ are tubercular; many tuberculous lesions are not tubercular, and many tubercular lesions have nothing to do with tuberculosis.

“Perhaps the worst of it is that we keep on adding errors and monstrosities to our medical nomenclature, so that sometimes it seems more like a jargon than a language. Take the word

vaccine. The word is as badly misused as the principle. Its classical parent means cow, and 'vaccine' was used, of course, because cowpox was the disease transmitted by Jenner in the prophylaxis of smallpox. Certainly the present use of the word vaccination for injection of every possible sort of pathogenic bacteria, to say nothing of pollens and food proteins, has no justification on an etymological basis, and its use for all these things unrelated to the cow is an etymological bull. But, like many another atrocity of the same sort, its careless usage has become so widespread as to fix it, presumably for all time. We are, however, a little encouraged to see that some careful writers have made a slight impression on the prevalent error of speaking of deviation of complement when fixation of complement is meant. Some of these errors we owe to the Germans, who are remarkably lax in their scientific terminology, but one particularly grievous sin we get from the German literature through no fault of the Germans, namely, the literal translation of the compound adjective without rearranging it into English. From this source we get such sentences as 'the blood contains bacteria destroying antibodies' when, of course, the reverse is meant, for the bacteria are destroyed, not the antibodies. We read, likewise, 'albumin containing urine' or 'blood destroying poisons,' phrases that shriek loudly for at least a missing hyphen if they can not have a real English construction. Sometimes it is necessary to rewrite a dozen sentences in a single article just to get around this failure to arrange in English form the translation of the gloriously compounded German adjective, concerning which Mark Twain wrote so lucidly and with so much feeling. As for the habitual and unlimited misuse and abuse of the words 'case' by medical men and 'operate' by surgeons, we have on other occasions expressed our views. The observant physician, however, is beginning to realize at least the fundamental rules governing their usage."

Pennsylvania Farmer says editorially of tuberculosis-eradication work: "There should be a pronounced campaign conducted by every farm organization for the purpose of enlightening all stock owners on the need of persistent and effective measures to stamp it out. Hence, the accredited-herd movement is a good one and should have the active interest of every farmer."

THE ADDRESS OF THE PRESIDENT¹

By ALBERT T. KINSLEY

Kansas City, Mo.

IT IS gratifying to see so many delegates and visitors at the opening session of the Fifty-ninth Annual Convention of the A. V. M. A. I am not unmindful of the honor you conferred upon me when you elected me President at the Denver meeting. The official responsibilities were assumed and the duties have been discharged with pleasure. Various questions pertaining to policy have arisen from time to time and the decisions were made for the best interests of the entire profession, according to my best judgment. Errors may have been made, but not intentionally.

The President's address is a requirement, not a privilege, and unfortunately the constitution does not give specifications as to subject matter, length, style nor delivery. In preparing this discourse, the comfort and personal liberties of the audience have been considered and in so far as possible, burdensome details have been eliminated. It has been assumed that the purpose of an address is to review important problems and to indicate policies for the future advancement of the veterinary profession.

The "evolution of the veterinarian to the present standard has been the result of the properly directed efforts and cooperation of the leaders of our profession and has been as rapid as could reasonably be expected, and compares favorably with the development of any other profession." The veterinary profession is composed of veterinarians engaged in various phases of veterinary activities. The different groups that constitute our profession are interdependent. Regardless of the groups we individually represent, we should have broad enough vision to realize the importance of every phase of veterinary activities. All veterinarians whether they be teachers, research workers, practitioners, sanitarians, army officers or those engaged in commercial enterprise, have an important function. Advancement and progress depend upon the harmony existing within and between each group constituting our profession.

¹ Presented at the fifty-ninth annual meeting of the American Veterinary Medical Association, St. Louis, Mo., August 28 to September 1, 1922.



DR. A. T. KINSLEY

A detailed description of the early history of the veterinary profession in America would be superfluous; however, a résumé of veterinary affairs as they have occurred, particularly in the corn belt during the last two decades, is of interest and worthy of careful consideration because there have been more or less unrest and discontentment in our profession during the last two

or three years and the question, "What about the future of the veterinary profession?" is pertinent at this time.

The following remarks are confined in general to the rural practitioner. They are not criticisms, but are the autopsy findings of the last twenty years of veterinary activities in the central states. If we can diagnose the case and identify the cause, the time allotted for this discussion will have been well spent. Until about 1912, practitioners were primarily engaged in the medical or surgical relief of disease; some obstetrical cases, principally in mares; castration of colts; examination for soundness, with an occasional request for tuberculin testing. During this period or until the perfection of blackleg aggressin and filtrate, blackleg vaccination was done almost entirely by stockmen. Equine practice constituted the major portion of the practitioner's routine business, a very small per cent of his income was derived from services rendered in the control of infectious diseases, excepting shipping fever in horses and an occasional enzootic of glanders. Diseases of cattle other than milk fever and occasional cases of mammary disturbances, and those conditions that could be relieved surgically, were given little consideration. Diseases of swine and poultry were rarely given more than a passing thought.

Veterinarians in the Federal quarantine service and those in state service were concerned primarily in the prevention and control of glanders, tick fever and scabies and the eradication of foot-and-mouth disease when it occurred in this country. The Bureau of Animal Industry, several states and some municipalities had inaugurated tuberculosis regulations, but little effective work had been done prior to 1912.

The discovery of the filterable virus of hog cholera by Dorset, McBride and Niles was announced in 1904 and the production of anti-hog cholera serum followed, although this product was not produced in sufficient volume prior to 1912 to be of value in the control of hog cholera excepting in limited areas.

From the foregoing, it is evident that the practitioner formerly confined his efforts primarily to equine practice and principally to the treatment of individuals rather than herds.

Veterinary practice in rural communities in the corn belt is quite different from what it was one or two decades ago. The veterinarian's services at this time are principally confined to

the prevention and control of infective diseases of meat-producing animals in herd units, and twenty years ago it was almost entirely confined to the medical and surgical relief of individual draft animals. The successful veterinarian of today is an immunologist; the successful veterinarian of twenty years ago was a surgeon. The transition of the veterinarian from a surgeon to an immunologist was a sequence of the development of bacteriology and the knowledge that was forthcoming relative to the cause and prevention of microbial diseases. This transition was too sudden and complete for the best interests of all concerned. For instance, some practitioners practically confine their services to immunization of swine, at least during certain seasons. In some sections surgical operations are so rare that they are a novelty. Was the tendency of the veterinarian to specialize as an immunologist for the best interests of the livestock producer? Was the service rendered by the practitioner twenty years ago of value to the livestock owner? Have the conditions that formerly required surgical relief ceased to exist? The answers to these questions should give food for thought and will probably give light for our future guidance.

In addition to the change in veterinary practice there has been a state of unrest in the American people since the close of the war. This condition permeated practically every business and has delayed the return to normal. The psychology of the post-war conditions is difficult to interpret. The financial depression, particularly, of agricultural commodities, was reflected to the veterinarian and was an important factor in the occurrence of unrest in our profession. Because of the sudden reduction in value of livestock, the farmer and stock producer found it necessary to diminish the cost of production which included veterinary services and particularly the charges for immunization of swine against cholera. The discussion, both privately and publicly, relative to this question, was most unfortunate for in many instances it created an unkindly feeling between stockmen and veterinarians. The livestock producers, in some states, sought relief by legislation, because of an apparent restricted sales policy of anti-hog cholera serum and virus. Unfortunately, there was some discord and strife in our ranks and this was used and proved to be a formidable weapon. This controversy was initiated, stimulated and continued by a few indi-

viduals on either side, who we assume had good intentions but the outcome came near being disastrous. This problem probably could have been solved with little or no controversy if the interested parties would have talked to, not about, each other. The "Sin of Pride," according to Dr. Macatee, President of the Medical Society of the District of Columbia, was one of the causes of the state of unrest of the medical profession and would it not be pertinent to ask ourselves whether or not this was and is equally *applicable to the veterinary profession?*

The difficulties that our profession has encountered may have been discouraging but the experience has been valuable. There are periods of depression and perplexing problems to solve in all walks of life. Our moral stability has been strengthened by mastery of the depressing influences and we have developed by the solution of the difficult problems.

The future of our profession is dependent upon our attitude toward and relation with agricultural interests. The degree of success will depend upon progressing, not retrogressing; commending the good work of others, not in slander; cooperation, not discord and dissolution; and a general service, not in a restricted service. We should lend our influences in matters that will make for better livestock production. Every veterinarian should support the cause that is being championed by the Horse Association of America. It must be conceded that the horse is the logical economical power on the average American farm. There will be an increasing demand for good draft horses in the future and the present demand for good saddlers exceeds the supply. The veterinary profession will survive, because veterinary service alone insures the livestock industry against the ravages of disease and is indispensable in the conservation of the health of nations.

The history and development of the American Veterinary Medical Association is a matter of record. The accomplishments, particularly educational and legislative, due to the influences of this association, are well known. The policies of this organization have shaped the destinies of the veterinary profession in America, as well as paving the way for a closer relationship of international veterinary affairs. We should not be contented with past attainments but should anticipate and provide for future progress.

In order that an organization of this character be of maximum service, a large percentage of eligible men should be members. In conformity with this idea a special campaign to increase our membership was inaugurated. The various District Executive Committeemen have cooperated with the Resident Secretaries in their respective districts and all eligible non-members have been advised of the advantages of their becoming members. There are only approximately sixty per cent of the eligible veterinarians in North America enrolled as members. There must be some reason why the other forty per cent are not members. The large percentage of eligible non-members are practitioners. It is difficult for practitioners to attend our conventions and particularly those from the remote sections of the country. Ways and means could probably be devised for stimulating a desire for more eligible veterinarians to attend our conventions, and become active members. Our literary programs could probably be made more interesting for practitioners if more men engaged in practice could be induced to present or demonstrate some important practical subject. Round table discussions on practical subjects would be a means of stimulating more interest and therefore a larger attendance. Diagnostic and surgical clinics are attractive to a certain group of men and would, no doubt, be a drawing card for those who are particularly interested in practice. The time devoted to our business sessions could probably be reduced and thus permit of more time for the literary program.

Considerable time has been devoted to a careful study of the future possibilities of the A. V. M. A. and it appears to be advisable to make some rather drastic changes in our constitution and by-laws, in order that the association can more nearly approach the maximum service. A closer affiliation of this association with state and provincial associations would be an advantage. The necessity for some change was deemed so imperative that a special committee was appointed to investigate and report at this meeting, and it is recommended that the plan suggested by the committee on closer affiliation of this association with state and provincial associations be received and that a committee of five be appointed to confer with the executive committee for the purpose of perfecting plans for re-organization.

There was some discord and lack of cooperation and a tend-

ency for certain groups of our members to form factions. Harmony and cooperation are essential for the success of any organization. Unity signifies strength. The membership of this association represents every phase of veterinary activity, and this association is therefore representative of the entire veterinary profession. Each member should consider himself a committee of one empowered to act in preventing and overcoming discord and strife between individuals or groups. One purpose of this organization is to promote good fellowship and how can this be more effectively accomplished than by ironing out the difficulties, imaginary or real, of fellow members.

The unit of our profession is the veterinarian and this association is the guardian of our profession. Membership in both the veterinary profession and this association increased by leaps and bounds until 1918. The attendance at veterinary colleges in this country reached its maximum in 1912, since which time it has decreased rapidly. In 1914 there were approximately 750 students who were graduated from the veterinary colleges in this country. According to the report of Dean David S. White, the total enrollment in the thirteen state supported colleges in 1919-20 was 800; in 1920-21, 708; and in 1921-22, 641. The total enrollment in all veterinary colleges in North America in 1920-21 was less than one thousand. The financial depression incident to the war was the principal factor causing the sudden and phenomenal decrease in the number of veterinary students and was also responsible for the closing of several privately operated colleges.

The difference in the number and value of farm animals in 1912, the year of maximum attendance in veterinary colleges, and 1922, the year of minimum attendance in veterinary colleges, does not justify the apparent decrease in the demand for veterinarians and in the number of veterinary students. There are less than 12,000 veterinarians and probably not more than 10,000 in the United States engaged in professional services. The average professional man continues in service from twenty to twenty-five years, and if this is applicable to veterinarians there would be not less than 400 retiring from the profession each year. The number of graduates from all of the veterinary colleges each year is not sufficient to maintain our ranks. There is a noticeable increase in the production of better livestock and

this will increase the demand for more and better veterinary service. The temporary surplus of veterinarians will soon be exhausted and then there will be a demand for veterinarians and plans should be devised to increase the attendance at veterinary colleges. Unless there is an increased attendance in veterinary colleges, the number in our profession and the membership of this association will necessarily decrease.

The advertising that was done by privately operated veterinary colleges was of value, not only in obtaining students, but also in keeping the veterinary profession constantly before the public. State supported veterinary institutions appear to have been restricted in their advertising. There has recently been such a scarcity of publicity of veterinary colleges that some men who were interested have inquired of veterinary journals and commercial concerns as to the location of a veterinary college. It would appear that the authorities of the state colleges would do well in perfecting plans for more extensive advertising. If such an advertising campaign can not be executed by the veterinary colleges, I would suggest that some committee or the secretary of this association be authorized to advertise the possibilities of the veterinary profession, referring the inquiries received from prospective students to the most accessible veterinary college. It is not only a privilege but also a duty for every veterinarian to recommend the veterinary profession as a life work to properly qualified young men. In recent years, the difficulty of obtaining funds to defray expenses while in college has denied to some young men the privilege of obtaining a veterinary education, and it would appear as though this association had overlooked the fact that a fund may have been made available for this purpose. I refer to the Salmon Memorial Fund and recommend that arrangements be made so that the interest on this fund be made available at once for the use of some deserving student or students. You should be interested in knowing that the Ladies' Auxiliary has completed arrangements for supplying funds to a veterinary student, thus enabling him to complete his course of study.

This association has continuously labored for a high standard of veterinary education. The progress of our profession has corresponded with the increasing of the educational requirements of veterinary institutions. Our present rank and standing

which compares favorably with that of other learned professions was attained by increasing our educational requirements. The present standard has been attained by the combined influences of this association, the B. A. I., and the War Department. Veterinary colleges should be commended for their cooperation in the advancement of matriculation requirements, in lengthening and broadening of the course of study. Radical changes pertaining to educational matters should be avoided; however, it would probably be advisable for veterinary colleges to provide a more comprehensive course on poultry diseases, sex hygiene and feeds and feeding. A course detailing general business methods and the manner in which a practice should be conducted would be of very great value to the embryo veterinarian and should be incorporated in the curriculum. Veterinary colleges are educating men that will enter the various branches of our profession, such as research workers, teachers, army officers, sanitarians and practitioners. It must be assumed that specialists in a certain branch are familiar with the educational requirements and training that equips men for such service and it is therefore recommended that the constitution and by-laws be so amended that the committee on Intelligence and Education consist of one veterinary teacher, one B. A. I. veterinarian, one army officer and two practitioners. This recommendation is not a criticism of the personnel of this committee or their activities for they have done a wonderful work.

The retrenchment policy of the last congress included a reduction of Army veterinary officers. The necessity for the reduction in the number of Army veterinarians is regrettable but no doubt the efficiency of the Veterinary Corps will be maintained. According to a recent report a veterinarian has been selected for director of the Veterinary Corps. This selection is significant as it indicates confidence, not only in the officer assigned to this duty, but also in the veterinary profession as a whole. This would appear to be a step in preparation for a separate veterinary organization.

The detection and control of tuberculosis is progressing rather rapidly. This is primarily an economic problem. The appropriation both Federal and State, has been sufficient to maintain this work on rather an extensive scale. The area plan is apparently gaining in favor. Those in charge of this work

should not lose sight of the fact that the control of an insidious widespread disease like tuberculosis, depends upon public sentiment. The livestock producer is more impressed by a realization of the stupendous financial loss occasioned by this disease than he is by all other propaganda. The packers have recently proposed to give a premium for swine from those counties in which all cattle have been tuberculin tested and in which proper disposition has been made of all reactors. This will be a stimulus for area eradication. If effective plans are inaugurated that will be acceptable to the stockmen for the maintenance of tuberculosis-free herds in tuberculosis-free areas and also accredited herds, the problem of tuberculosis control would appear to be solved, although the ultimate goal is in the future. This is a sanitary control measure that is of national and international importance and should be supported by our entire profession.

Abortion disease constitutes a very serious problem, viewed economically, because of the extensive losses occasioned by it. Investigations tend to show that abortion disease exists in most dairy herds in this country and is observed in beef herds, even on the range, in many parts of the United States.

The diagnosis, successful treatment and control of the diseases of swine are engaging the serious consideration of the veterinarian. According to reports there have been more outbreaks of hog cholera and more swine treated up to this time with serum and virus than for a like period in any previous year. No doubt, hog cholera is responsible for more losses of swine by death, after they are one month of age and until matured, than all other diseases combined. The complex of swine disease is gradually being unraveled. Swine erysipelas has been positively identified in this country and is apparently quite widespread. Veterinarians should familiarize themselves with the symptoms, lesions and control of this disease. Infectious necrotic enteritis and hemorrhagic septicemia are exacting their toll from the swine producer. The most extensive losses of swine so far as numbers are concerned, occurs from the time of farrowing until the pigs are about one month of age. The little pig losses are largely due to faulty breeding, improper feeding and parasitism and are all preventable. It has been demonstrated on a small scale, that swine production can be increased 50 to 80 per cent by

careful breeding, proper feeding and the provision of sanitary quarters.

The interest shown in poultry clinics at recent veterinary meetings indicates the possibilities of poultry practice. Avian tuberculosis, fowl cholera, fowl typhoid, roup and parasitism are some of the diseases that are relatively common in poultry. The intradermic tuberculin test is quite reliable in detecting tuberculous fowls but practitioners are at a loss in disposing of reactors because of the absence of any state regulations. This problem should receive the consideration of state regulatory officials.

The investigation of animal parasites has revealed much valuable information. The life cycle and methods of control of the ascarids of swine have been determined. A successful method for the treatment of sheep infested with the *Hamonchus contortus* has been revealed. It has been reported that a method for the relief of red mange in dogs has been found. The eradication of the fever tick will be realized in the not far distant future.

Deficiency diseases are apparently increasing in frequency. According to present available information, it appears justifiable to assume that the occurrence of these diseases is intimately associated with a deficiency or absence of vitamins, minerals and sunshine. These conditions are of considerable economic importance; in some instances they are difficult to identify. They should be given careful consideration.

The importance of a comprehensive knowledge of feeds and feeding can not be overestimated. Many conditions of dietary origin present a chain of symptoms so similar to those of infective diseases that they are frequently erroneously diagnosed and improperly treated. The excessive loss of colts, calves, lambs, pigs and chicks is primarily due to disturbances of digestion induced by improper diet.

Sex hygiene has been given little consideration by most veterinarians since the days of extensive horse breeding. The adoption of proper breeding methods in meat-producing animals would vastly enhance the returns to the breeder. The low vitality of young animals, especially calves, lambs and pigs, is usually directly traceable to pasture breeding or some other improper method of breeding. A greater efficiency in breeding is

one of the most important economic problems of the livestock industry.

The rewards of the purebred-sire campaign fostered by the B. A. I., will soon be forthcoming. This movement will exemplify the value of purebred sires in the economic production of a better grade of livestock. An address of this kind would not be complete without commending the activities of the B. A. I. It is not only the largest but also the most efficient organization of its kind in the world. Public service and state medicine, particularly in the last decade through the agency of the veterinarians of the B. A. I., state sanitary boards, and municipal health departments, should be given credit for developing public confidence in the veterinary profession and thus creating a greater demand for the services of the practitioner. The cooperative educational and demonstrational work on hog cholera control which was done by the Bureau of Animal Industry and various states, paved the way for the extensive swine practice of today. No doubt, the practitioners that are prepared will find an increasing demand for their services in tuberculin testing when public sentiment has been more firmly established by the cooperative testing that is now well under way.

Transportation companies in the central and western portion of the United States realizing the value of conservation of livestock have an organization of veterinarians investigating the cause of the losses of livestock in transit and suggesting improved methods to the shippers to prevent such losses.

In 1914, A. M. Palmer, who was then United States Attorney General and Alien Property Custodian, sold 4,500 chemical patents to "The Chemical Foundation," a corporation organized to encourage chemical industry in America and not for profit. This corporation was authorized to issue licenses to any competent and properly equipped American individual, firm or corporation on such of the patents as might be utilized in the promotion of American chemical industry. The value of the manufacture of dye stuffs and chemicals to American industries, to scientific and technical investigations and to all phases of the medical profession can not be overestimated. A German delegation has recently demanded the return of the patents and a revocation of the licenses issued by the Foundation to various manufacturers. From reports, it is evident that their requests

are being given consideration and it would seem timely for this association to go on record by resolution or in some other way favoring the continuation of the Chemical Foundation.

Since our last convention some of our members have completed their journey on life's highway and crossed to the Great Beyond. Proper resolutions will be presented by the Committee on Necrology in due time, paying tribute to those who have gone before.

I wish to commend the cooperation and activities of the officials, committees and individuals of the association during the past year. The success of the present meeting must be attributed to the combined action of all.

Before concluding, I wish to compliment the ladies. It is gratifying to see so many in attendance and you may rest assured that we appreciate your presence. I trust that the Fifty-ninth Annual Convention of the A. V. M. A. will be successful and that in all of our deliberations there will be good fellowship.

SOME TUBERCULOSIS HISTORY

Among the articles of important events happening thirty-five years ago, as published recently by the *Newtown (Pa.) Enterprise*, there appeared the following:

"Newton Enterprise, Newtown, Penna., June 4, 1887.—Eleven cows and a bull, belonging to C. Sidney Mather, of Middletown township, having been found to be afflicted with tuberculosis were killed in the presence of State Veterinarian Bridge, and all buried in a trench on the farm, after the hides and fat were removed. The herd was attacked with the disease about a year previous and was condemned at a meeting of neighbors, who feared the spread of the disease. The value of the cattle was appraised by Joseph Milnor, Godfrey Schaffer and Samuel M. Fite at \$250, to which amount the owner was reimbursed by the community."

That was before the days of compensation in such cases by the state.

It would thus appear that tuberculosis was diagnosed in this herd, the cattle condemned by State Veterinarian Dr. Francis Bridge and indemnity paid to the owner five years after Koch discovered the tubercle bacillus in 1882 and three years before tuberculin was first prepared.

PRELIMINARY REPORT ON EQUINE BOTULISM IN CANADA ¹

By CHARLES A. MITCHELL

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Canada*

IN THE HUMAN FAMILY, especially in those continental countries where meats are sometimes consumed without being thoroughly cooked, food poisoning has long been known. No differential diagnosis was made between different kinds of food poisoning, and not until the science of bacteriology had made considerable advancement were the real causes and differences of the various types of poisoning precisely understood. In comparative medicine until recent years little or no thought was given to the poisoning of fodder by bacterial invasion and the consequent intoxication of animals eating the same. It is true that a certain set of symptoms which were found in animals and classified under a variety of names were frequently put down to be the result of eating certain fodders. More often they were thought to be the result of bacterial invasion of the brain or spinal cord.

The causative agent of botulism was first recognized by Van Ermengen (1)² in 1896. He isolated a bacillus from a ham, portions of which had been eaten by several persons. These persons had developed a neuropathic toxemia. The organism was found (though unable to produce a bacteriemia) to excrete an exceedingly potent soluble toxin. Later studies by various other workers confirmed in main the work of Ermengen. Thus from 1896 on, poisoning by *Bacillus botulinus* from meat sources has been more or less precisely recognized in human medicine.

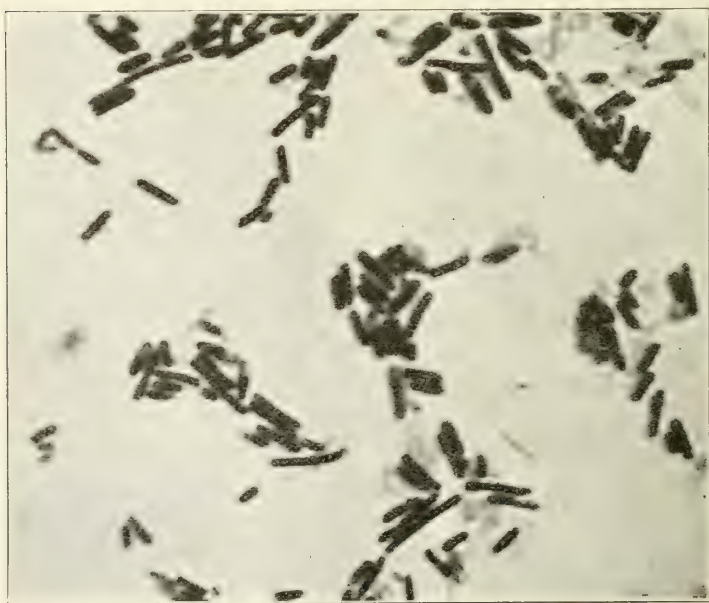
The first suggestion that botulism might occur in animals was made by Pearson (2) in 1901. He drew attention to the clinical similarity between what was known as forage poisoning in animals and that of botulism in man. No definite research work was made to prove or disprove this hypothesis of Pearson

¹ This paper is published by permission of Dr. F. Torrance, Veterinary Director General, and Dr. E. A. Watson, Chief Animal Pathologist.

² Numerals in parentheses following authors' names refer to list of literature at end of paper.

until 1916. This is not to be wondered at since at that time it was not known that *B. botulinus* would develop on foods other than meat. Also a number of investigators (to be alluded to later) had succeeded in isolating various microorganisms which were put forward as the causative agent of the set of symptoms which is variously termed forage poisoning, cerebrospinal meningitis, blind staggers, cornstalk disease and botulism. In the meantime certain observations were gradually pointing to the fact that vegetables and fodder might be the media for the growth of *B. botulinus*. Thus Wilbur and Ophuls (3) drew attention to twelve cases of botulism in human beings, which was brought about by eating canned beans. Dickson (4) in 1915 was able to show that *B. botulism* developed on string beans.

In 1916 Buckley and Shippen (5) conducted a study of the action of *B. botulism* on horses. They were able to produce a disease in horses which presented symptoms analogous to those of cerebrospinal meningitis and forage poisoning. A year previous to this Himmelberger (6) was able to report that a certain mold, *Monascus purpureus* (Went), which on empirical



Microphotograph of *Bacillus Botulinus*.
(Taken from smear prepared from broth culture.)

grounds had been charged with causing forage poisoning, was harmless to animals. Graham, Himmelberger and Pontius (7) were able to show that a certain particular lot of oat hay was capable of producing forage poisoning in the animals to which it was fed. In 1918, Graham, Brueckner and Pontius (8) demonstrated the presence of *B. botulinus* on certain forage that had caused intoxication in Kentucky. Moreover, they grew the bacillus on artificial media and produced the disease by the oral administration of the toxin elaborated by it.

About this time Burke (9) of California made several important contributions to the literature on this subject. He demonstrated the presence of *B. botulinus* in nature. He also accounted for several vagaries noted in connection with this organism. For example, Dickson had prepared an antitoxin against three different strains of *B. botulinus*. He found that while two strains were alike, the toxin of the third strain could not be neutralized by the antitoxins of the first two strains. Burke, carrying this work still farther, and using many strains, demonstrated that *B. botulinus* was made up of two types, which he designated type A and type B. Antitoxin made from type A will not neutralize toxin of type B, and vice versa. An interesting point in this work was the fact that type A seemed the predominant organism on the Pacific coast, whereas in eastern America type B appeared predominant.

A recent paper which has just come from the press by Nevin (10) is quite interesting from the fact that *B. botulinus* was found growing in cheese and also that the work she alludes to was done in 1914, and therefore, her strain of *B. botulinus* was the first isolated in America.

Allusion has already been made to the similarity of the symptoms presented in so-called cerebrospinal meningitis, forage poisoning and botulism. Pathological and bacteriological investigations have failed to prove that cerebrospinal meningitis is an infection of the brain or spinal cord. Siedamgrotsky and Schlegel (11) isolated a diplococcus from the brain of an infected animal. Johne (12), working about the same time, isolated a coccus from the nervous tissue of infected animals. Ostertag (13) also isolated an organism which bore a resemblance to the organism isolated by Johne. Harrison (14) of Canada

isolated a different organism which he believed to be the cause of the disease.

No investigator produced clinical cerebrospinal meningitis with his organism.

In 1919 at this laboratory we isolated an organism which resembled the organism described by Ostertag, from the brain of a horse which died of what was diagnosed cerebrospinal meningitis. This organism proved nonpathogenic except in large doses. Looking back, we have no doubt that we were dealing with botulism, as there was a clear history of animals having had their feed changed to certain discarded ensilage some days before the outbreak in question. Moreover, a variety of organisms (streptococci, colon, etc.) have been isolated from brains of animals dying from dourine, swamp fever and other diseases. It is apparent that there is no conclusive evidence that cerebrospinal meningitis is caused by a microorganism gaining entrance to the central nervous system, and it seems reasonable to classify this disease (since symptoms are exactly similar) as botulism, unless some future bacteriological investigations demonstrate that it may occur as an infection separate and distinct in itself.

It would be better to drop the term "forage poisoning" when poisoning by the toxin of *B. botulinus* is meant, and to restrict its use to poisoning due to plants such as water hemlock. A great deal of unnecessary confusion in the minds of persons not following the literature closely would thereby be avoided.

BOTULISM IN CANADA

For a number of years reports have been received from private practitioners relative to outbreaks of this disease in different parts of Canada. The outbreaks were in nearly every instance confined to the one farm. Sometimes only a few horses were infected and in other cases almost the entire herd would contract the malady. From these reports which were received from time to time we are able to say that botulism has occurred in Canada for many years. At no time, however, were the losses so heavy that the disease was brought prominently before our Division, and although the losses to some individual owners were exceedingly heavy, to the country as a whole they were much less than from some of the other contagious diseases.

A RECENT OUTBREAK

In the autumn of 1921 an outbreak of so-called cerebrospinal meningitis occurred on a farm situated between Ottawa and Kingston. The location of this farm was on dry land, and the buildings were in excellent hygienic condition.

On October 12 four horses became diseased simultaneously and died in from twelve to twenty-four hours after the first symptoms were noticed. The remainder of the animals of the herd showed no evidence of disease at this time. The owner, a week later, purchased one horse and brought him to his premises. On October 27 the three remaining horses of the original herd and the one purchased became suddenly ill, presenting the same symptoms. All animals died in less than thirty hours.

Questions directed to the owner elicited the information that the eight horses had been fed from a common hay supply. Four of the animals, which were being worked, were fed oats. After October 12 the water supply was changed. It was therefore apparent that the only feed received in common by all horses was the hay. The owner stated that this fodder was cured very rapidly owing to the hot weather during haying time, but with this exception it seemed of the very best quality.

POSTMORTEM EXAMINATION

The lesions presented were in marked contrast to the severity of the symptoms. Blood was found in dark color and did not coagulate rapidly. The lungs, liver and spleen appeared normal. The heart presented a slight capillary congestion. The kidneys appeared normal, but the adrenal bodies seemed slightly congested. The circulation of the stomach and intestines was congested. On opening the cranial cavity a general engorgement of the circulation was noticed. Smears made from the blood, spinal fluid, brain, liver and spleen were examined, but no micro-organisms were found present.

The following materials were collected for laboratory examination: Samples of spinal fluid, pieces of brain, and samples of ingesta from stomach, small intestine, cecum and colon.

LABORATORY EXAMINATION AND ISOLATION OF STRAIN F

The brain was placed in a sterile vial with some sterile bead and a small amount of nutrient bouillon added. This was

shaken until the tissue was disintegrated. Small amounts of this material were transferred to tubes containing melted glucose nutrient agar. The tubes were shaken and then rapidly cooled. A layer of sterile liquid petrolatum was added to each tube to insure anaerobic conditions. Some of these tubes were incubated at 28° C. while the remainder were incubated at 37° C. No growths occurred.

The cerebrospinal fluid was cultured under conditions similar to those described above, and was found to be sterile. Cultures made aerobically revealed a few colonies of Gram-positive diplococci. Inoculated into guinea pigs this organism was nonpathogenic.

The samples from stomach, small intestines, cecum and colon were pooled and cultures made in the following manner:

Nutrient bouillon was seeded with the pooled material and incubated a few hours at 37° C. It was heated to 60° C. for a short time and then cooled. This process was repeated. The object was to destroy aerobic and facultative anaerobes as far as possible. Quantities of this material were seeded into melted agar. The tubes were gently agitated to mix the material evenly through the medium, and cooled rapidly. A layer of sterile mineral oil was added to insure anaerobic conditions. Some of the tubes were incubated at 37° C., others at 28° C.

Tubes were examined each day, and when distinct colonies were plainly defined the tubes were slightly heated and the agar transferred to Petri dishes. Each colony was carefully teased out, smears made and media inoculated. Several colonies were found to conform to description of *Bacillus botulinus*. Tubes inoculated from these colonies were incubated at 28° C. and when growth was visible, sub-cultures were made in minced meat medium.¹ This was also incubated at 28° C.

It was found that toxin was produced in the minced meat medium. After incubating the culture for fifteen days it was centrifuged until the supernatant fluid contained no bacteria. Experiments showed that 0.2 c.c. killed guinea-pigs when given intraperitoneally, and 0.4 c.c. given per os also caused death.

¹ Beef heart finely minced.....250 grams
Water250 c.c.

Heat slowly, cooking meat thoroughly; add normal soda until mixture is markedly alkaline to litmus; sterilize at 120° C. for one hour for three consecutive days.

CHARACTER OF ORGANISM

Our organism, which will from now on be called *Bacillus botulinus* F, was found to possess the following characteristics:

1. Strict anaerobe.
2. Takes Gram's stain.
3. Bacillus with rounded ends.
4. Terminal spores formed which had tendency to bulge the organism.
5. Formed short chains in liquid media.
6. Grew well at 28° C.; not so well at 37° C.
7. Produced a distinct, disagreeable, rancid odor and gas in media.
8. Produced a powerful soluble toxin which was fatal to guinea-pigs, intraperitoneally, subcutaneously or per os.

Being convinced, now, of having isolated *B. botulinus*, experiments were undertaken to determine what type of organism we were dealing with. Antitoxins against type A and also against type B were obtained through the courtesy of the Bureau of Animal Industry, U. S. A. Toxin was produced by growing our organism in minced meat and its M. L. D. determined to be 0.2 c.c. The antitoxin was mixed with the toxin and incubated for 30 minutes at 37° C. Table 1 illustrates the procedure and results.

TABLE 1.—INOCULATION TESTS OF ORGANISMS.

M.L.D. toxin	Amount of antitoxin	Inoculated into—	Result
F. 0.2 c.c.	O, incubated at 37° C. for ½ hour	2 guinea-pigs	2 deaths
F. 0.2 c.c.	Antitoxin B, 2 c.c., incubated at 37° C. for ½ hour	2 guinea-pigs	No deaths
F. 0.2 c.c.	Antitoxin A, 2 c.c., incubated at 37° C. for ½ hour	2 guinea-pigs	2 deaths

It will be noted from the results that type B antitoxin protected animals against toxin of *B. botulinus* F, so that the strain isolated was *B. botulinus* type B.

EFFECT OF TOXIN ON HORSES

A culture of *B. botulinus* was grown at 28° C. for sixteen days in minced meat medium. The culture was centrifuged one hour to throw down the bacilli. The supernatant fluid removed and examined under the microscope revealed no bacilli. Five

cubic centimeters of this germ-free toxin was given to a horse orally on the evening of January 10.

For three days he remained quite healthy. On the fourth day he was found to have extreme difficulty in swallowing and the muscles of deglutition became totally paralyzed. Salivation was very profuse; pupils were enlarged, and there was loss of the power of accommodation. Later ptosis developed. Extreme muscular weakness came on, and the animal became decumbent eight hours after first symptoms were noticed. No sensory paralysis was found at any time. Temperature remained normal, becoming subnormal shortly before death. Pulse and respirations did not vary much from normal until just before death.

Postmortem examination showed the brain to be extremely congested. Only the head was examined. Smears made from different regions of the brain revealed no organisms, and guinea-pig inoculations were negative.

Horse No. 2, an old horse badly affected with "heaves," was fed 5 c.c. of filtered toxin on oats. Curiously enough, after about twelve hours his breathing difficulty ceased. This was possibly due to a partially paralyzing action of the toxin upon the higher respiratory centers. The animal did not manifest any decided symptoms until the third day, when he suddenly collapsed and died in a short time.

Postmortem examination did not reveal any very marked pathological changes. Capillary congestion of the heart, lung and abdominal viscera were the most outstanding of the changes

noted. AFFINITY OF TOXIN FOR BRAIN TISSUE

It is known that the toxin produced by *Bacillus tetani* has a definite affinity for nerve cells, and when once anchored to these cells the union seems to be of a permanent nature.

Since the clinical symptoms indicate that there may be an affinity between certain portions of nervous tissue and the toxin of *B. botulinus*, experiments were undertaken to determine if this union took place in vitro as it does in the case of tetanus antitoxin.

The brain was removed from a healthy guinea-pig which was killed for the purpose. It was weighed and macerated with two and one-half times its weight of normal saline, and the experiments shown in Table 2 were performed.

TABLE 2.—EXPERIMENT TO TEST AFFINITY OF BOTULINUS TOXIN FOR BRAIN TISSUE.

M.L.D. toxin	Brain tissue, emulsion	Incubated at 37° C.	Inoculated into—	Death in—
0.1 c.c. toxin	1 c.c.	5 hours	1 g.-pig	12 hours
0.2 c.c. toxin	1 c.c.	5 hours	1 g.-pig	12 hours
0.1 c.c. toxin	.....	5 hours	1 g.-pig	12 hours
	1 c.c.	5 hours	1 g.-pig	Alive

The results do not indicate that *B. botulinus* toxin becomes fixed in vitro, at least with a sensitization period of five hours.

TOXIN PRECIPITATION

Five cubic centimeters of toxin was slowly dropped into 100 c.c. of 95 per cent alcohol. A brownish precipitate formed which settled to the bottom. It was allowed to settle overnight, and in the morning the alcohol was poured off and the residue allowed to dry in the incubator. A gummy brownish substance resulted. To this twenty times its weight of distilled water was added, and 0.1 c.c. of the mixture was given to two guinea-pigs, one orally, the other subcutaneously. Both pigs died in about twelve hours.

The toxin may, therefore, be precipitated in the presence of alcohol. This might be a useful manner to purify the toxin from other proteins for antitoxin work.

TOXIN B. BOTULINUS F—EFFECTS ON CHICKENS

We found chickens immune to our toxin from *Bacillus botulinus* F, even in massive doses. Ten cubic centimeters of toxin was fed to six small chickens. These animals remained quite well. They were taken out of the cage, and two guinea-pigs were placed in the same cage and fed so that their food came in contact with the excreta from the chickens. On the third day both pigs died.

It is clear that the toxin passed through the alimentary tract of the chicken unchanged.

IS TOXIN ABSORBED AND STORED IN THE EGG?

A laying hen was fed 3 c.c. of toxin and her eggs were collected for eighteen days, during which time seven eggs were laid.

The experiment was conducted as follows: One egg was shaken with beads until emulsified. It was then divided into two equal portions and a guinea-pig inoculated intraperitoneally with one portion, while the other half was forced-fed to a second

guinea-pig. This was repeated with the remaining six eggs, and none of these showed any evidence of containing toxin.

This is of special importance to invalids and children, as it is readily understood that if the toxin were absorbed and deposited in the egg it might become a source of danger to those eating eggs in the raw state.

PRODUCTION OF TOXIN IN VEGETABLE MEDIA

Horses being herbivorous animals, it is apparent that the main source of toxin must be from the growth of *Bacillus botulinus* in a fodder medium. To test the production of toxins in this manner, the following medium was made up: Oats were sprouted until the sprouts were about 4 inches long. These sprouts were clipped off, thoroughly washed under sterile distilled water, and were then placed in sterile large glass test tubes and packed firmly with a glass rod until the liquid expressed from the green oats covered the surface of the pulp. Several tubes were then inoculated with a loopful of *B. botulinus*. The surface of each test tube was covered with sterile liquid petrolatum. They were incubated at 28° C. for ten days.

Smears were then made from the inoculated tubes and from control tubes. In the inoculated tubes *B. botulinus* was found, also some molds and yeasts. In the control tubes only molds and yeasts were found. Some of the liquid was drawn off from each tube and centrifuged and fed to guinea-pigs in varying amounts. The liquid from control tubes was found to have no effect on guinea-pigs. The liquid from inoculated tubes was found to cause a fatal illness in guinea-pigs in doses of 0.5 c.c.

This clearly indicates that *B. botulinus* may grow in fodder and produce its toxin. Clinical experience would rather indicate that not the whole mow full of hay is infected, but that the bacillus grows here and there, producing pockets of infective material. When the hay from one of these pockets is removed and fed, the illness is set up and only the animals receiving fodder from these local areas are infected. The herd will remain quite healthy until another pocket is fed, when the illness will again appear.

SUMMARY

1. *Bacillus botulinus*, type B, was inoculated from the ingesta of horses suffering from so-called cerebrospinal meningitis in Canada.

2. This organism produced a toxin which, freed from the bacilli, produced botulism in experimental animals.

3. This toxin does not become stably fixed to healthy nerve tissue in vitro when incubated together at 37° C. for a period of five hours.

4. Toxin may be precipitated in 95 per cent alcohol without loss of activity.

5. The toxin of type B is not absorbed from the alimentary tract of chickens and stored in the egg content.

6. *Bacillus botulinus* may be grown on vegetable media to produce a toxin which, in very small doses, is capable of causing fatal poisoning when fed to susceptible animals.

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The British Minister of Health has prepared an outline of a proposed uniform system of local meat inspection which he has recommended to the local authorities for adoption.

Wallaces' Farmer refers to B. A. I. service work and states: "It is encouraging to know that scientific students of heredity are now beginning to work with domestic animals instead of confining their attention solely to rabbits and guinea pigs."

IMPACTION AND ATONY OF THE RUMEN: ETIOLOGY AND TREATMENT¹

By LOUIS A. KLEIN

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IN THE HORSE the intestines, and especially the large colon, are more frequently affected by disease than the stomach, but in cattle the gastric compartments are more often deranged than the intestines. This is no doubt due to the fact that these two divisions of the digestive tract, although differing greatly in structure and location in the two species, possess certain similarities in function. Both the large colon in the horse and the rumen in cattle act as reservoirs for the greater portion of the alimentary matter in the digestive tract, and in each case the material present is subjected to a bacterial fermentation which breaks down the cellulose envelopes in which the nutritive substances in the food of herbivora are enclosed, rendering them more accessible to the action of the digestive fluids.

Of the four stomachs of cattle, the rumen is more frequently deranged than any of the others. This is due to its situation, it being so placed that it is the first to suffer from errors of diet. The fact that its activities are necessary to help put food in proper condition to be received and acted upon by the other gastric compartments makes its proper functioning of prime importance in the process of digestion. Derangements of the rumen are nearly always due to functional disturbance and not to organic lesions. This being the case, it is necessary to understand the physiology of the rumen in order to comprehend properly the departures from the normal to which it is subject and to be able to apply rational therapeutic measures for their relief.

In feeding, bovines take food into the mouth hurriedly and, after crushing it between the teeth by a few motions of the jaws, form it into a bolus with the tongue and swallow it. During its short stay in the mouth a liberal quantity of saliva is mixed with it. When swallowed, it passes into the rumen and reticu-

¹Presented at the semi-annual meeting of the Maryland Veterinary Medical Association held at the University of Maryland, College Park, July 20 and 21, 1922.

lum, where it may remain several days. The excess fluids gravitate to the reticulum, while the solids collect in the rumen in a moist condition. The rumen is therefore a reservoir where food is temporarily stored to be prepared for the action of the other parts of the digestive tract. While here it is macerated and softened by the saliva which is swallowed. The secretion of saliva is more or less constant in bovines and is an important adjunct to the proper functioning of the rumen and also of the omasum. A cow on dry feed secretes 50 to 60 quarts of saliva in 24 hours. In many diseases, especially those of a febrile type, the secretion of saliva is usually decreased or suppressed in common with the other secretions. This is indicated by a dry condition of the mouth.

After arriving in the rumen, the food is moved about and mixed by the contraction of the walls of that organ. There is some digestion of starches and proteins by the enzymes in the food, and fats are liberated from inclosing substances by agents of the same character, but these actions are not important. It is doubtful if there is any digestion of starches by the saliva, as it is believed to contain little if any ptyalin. The principal action in the digestive processes which take place in the rumen is the destructive fermentation of cellulose set up by bacteria swallowed with the food. By this action, the envelopes surrounding the nutritive substances in the food are broken down and the nutrients set free so that they may be exposed to the digestive ferments in the succeeding parts of the digestive tract. This bacterial fermentation is attended with the production of acids, gases and other substances, just as occurs in the large colon of the horse. The gases do not collect in the rumen in any considerable quantity under normal conditions, because they are eructated, especially during feeding and rumination.

While food in solid form passes directly to the rumen when swallowed the first time, water and other fluids for the most part pass through the omasum (third stomach) and obomasum (fourth stomach) directly to the duodenum, only a small portion going to the rumen and reticulum. The same is true of medicines when administered by the mouth, their destination depending upon whether they are given in solid form or in solution. It is important to keep this fact in mind in prescribing for cattle. If an action is desired which can be obtained only

after the drug is absorbed into the blood, then it should be given in solution so that the greater portion will pass directly to the duodenum, where it will be absorbed. There is no absorption in the first three stomachs. When digitalis is given in the form of powdered leaves, it passes to the rumen and the maceration to which it is there subjected destroys the active principles; consequently, when the drug is given to cattle in this manner no action upon the circulation is obtained. It is probable that there are other drugs which are affected in the same manner, but we have no definite knowledge on this point. If it is desired to introduce an antiseptic solution into the rumen to prevent fermentation and putrefaction, as in acute tympany, the solution will be most certain to reach the place where its action is needed if it is injected into the rumen through a canula inserted in the left flank. Formaldehyde solution or formalin are the best preparations for this purpose (one tablespoonful in a quart of water).

At certain periods, which occur at intervals during each 24 hours, the food in the rumen is carried up into the mouth in small portions and thoroughly masticated. As the chewing of each bolus of food is completed it is swallowed and passes to the omasum (third stomach), then another is immediately brought up from the rumen and the process is repeated. This is rumination. If we are to understand how and by what means this function may be disturbed it is essential to know the conditions which are required for its proper performance. These will therefore be briefly considered.

The act is purely voluntary. It is performed only when the animal is perfectly at ease in quiet surroundings. Certain other conditions are required. The rumen must be about half full and a certain quantity of fluid must be present in the rumen and reticulum. These conditions existing, the contraction of the walls of the rumen and reticulum, and the compression exerted upon these organs by the contraction of the inferior abdominal wall with the diaphragm fixed, then forces the contents of the rumen against the pillars of the esophagus. The latter draw together and separate from the mass a small portion of food, which is carried upward to the mouth by reverse peristalsis of the esophagus.

Upon the arrival of the food in the mouth, the excess fluid is squeezed out and swallowed and the remaining portion, after

being thoroughly masticated, is again swallowed and passes to the omasum (third stomach), the pillars of the esophagus closing and directing it to that gastric compartment. Here it is pressed between the leaf-like extensions of the mucous membrane, and the fluid which is squeezed out passes over to the abomasum (fourth stomach), while the part which remains in the omasum is subjected to further grinding between the leaves and when reduced to a state of fine division filters into the abomasum. In the abomasum (fourth stomach) the same digestive processes take place as occur in the stomach of the horse, there being an amylolytic and a peptic stage. The abomasum is the only true stomach; the other three compartments, although usually called stomachs, being really esophageal pouches, corresponding to the crop and gizzard of the chicken. Adult cattle find it necessary to devote 6 to 7 hours in each 24 to rumination. When two feeds are given daily, as is usual, there are about three periods of rumination in each interval between meals.

The absence of any of the external or internal conditions mentioned as requisite for rumination, or the failure of any of the organs or parts concerned in the process to function properly, will modify or suppress rumination. Any unusual condition or occurrence which disturbs the animal will cause it to stop ruminating temporarily, and if the condition is repeated at short intervals or continues to operate digestion will eventually be affected.

Since the contents of the rumen must have a certain volume for rumination to occur, the feed of cattle must be to some extent bulky. Therefore a certain quantity of roughage is necessary to their well-being. This explains why rumination is suspended when an insufficient quantity of roughage is fed.

A certain quantity of fluid being necessary for rumination, a sudden change from green to dry feed, a large feed of unusually dry fodder, or the exclusive feeding of very dry fodder with insufficient water will make it impossible for the act to be performed. An abundant supply of water is necessary at all times. Suppression of the secretion of saliva will also interfere with rumination by reducing the quantity of fluid in the rumen.

Weakness or paralysis of the muscular layer in the wall of the rumen will modify or entirely suppress rumination. This is the condition which is most frequently the cause of disturbance of

rumination in cows on dairy farms where intensive methods of milk production are in operation. Weakness or atony of the musculature of the rumen may result from a number of causes, among the most common being continued heavy feeding for high milk production, insufficient exercise, especially when accompanied by stabling in hot, poorly-ventilated stables; also exposure to cold winds and rains. Fresh cows for two or three weeks after calving, and animals which are weak from insufficient feed or from the effects of previously existing disease, are especially susceptible to these causes. Paralysis of the muscle in the wall of the rumen may be caused by giving a large quantity of ice-cold drinking water to an animal confined in a stall. The same kind of water will not be injurious, however, if the animal is required to walk to and from a stream or water-trough.

Rumination may be suspended for a longer or shorter period or it may be carried on in a feeble manner, the time devoted to chewing each bolus being shortened and the interval between the swallowing of one bolus and the rising of another being greater than normal. Imperfect rumination is often the first sign that the rumen is not functioning properly, and if it is unheeded and full feeding continued, impaction usually follows.

Any condition which interferes with rumination will lead to impaction of the rumen, and this in turn may be followed or accompanied by tympanites, impaction of the omasum (third stomach), or catarrh or inflammation of the abomasum (fourth stomach) and intestines. When impaction results from feeding a large quantity of unusually dry fodder or from the rumen being overloaded, as occurs when a cow breaks into a feed bin, it is sudden and pronounced; but when other causes are operating, especially those which produce an atony or weakening of the musculature of the rumen, the impaction occurs gradually and is always of a lesser degree. Cases of the latter type are more often seen on dairy farms where intensive methods of milk production are followed than on general farms. At first the only symptoms of disease apparent are cessation of rumination and loss of appetite, but auscultation will reveal that the wall of the rumen is not contracting in the usual manner, and on palpation it will usually be found that the rumen is fuller than ordinary and that the contents are firmer. There is often a decrease in the milk flow. If the animal is induced to eat by offering it

various tempting feeds the condition will be aggravated and recovery delayed, whereas proper treatment at this time will restore conditions to normal in a short time.

The treatment of impaction should be directed to restoring the functional activity of the rumen. This can be done by providing, in so far as is possible, the conditions which are necessary for rumination. If the contents of the rumen are dry and firm, water to soften the mass can be introduced by means of an esophageal sound or through a canula inserted in the left flank. If the secretion of saliva is scanty, it may be stimulated with potassium chlorate (2 to 6 drams) or, if the cost is not prohibitive, pilocarpin (3 to 5 grains). The musculature of the rumen may be stimulated by means of drugs and also by massage, liniments and exercise. The drugs which may be used for this purpose are tartar emetic ($2\frac{1}{2}$ to 5 dr.), alcohol (1 to $1\frac{1}{2}$ oz.), oil of turpentine (1 to $1\frac{1}{2}$ oz.), carbonate of ammonia ($\frac{1}{2}$ to 1 oz.), water of ammonia ($\frac{1}{2}$ to 1 oz.), ipecac (1 to $2\frac{1}{2}$ dr.), colchicum (tine., 1 oz.), veratrin ($1\frac{1}{2}$ to 3 grains), eserine ($1\frac{1}{2}$ to 3 grains), and arecolin ($\frac{1}{4}$ grain). Eserine and arecolin exert a direct stimulant action on the muscle of the rumen after being absorbed by the blood and may therefore be given hypodermically as well as by the mouth. How the other drugs mentioned produce their ruminatoric effect is not positively known. It has been demonstrated that the irritant action of alcohol, oil of turpentine and veratrin on the mucous membrane of the duodenum causes the wall of the stomach in monogastric animals to contract, and it is known that the nerve supply of the duodenum and the first, second and fourth stomachs in cattle corresponds to that of the stomach and intestines in monogastric animals. These facts would indicate that the drugs under discussion stimulate the muscle in the wall of the rumen reflexly by irritating the sensory nerve terminations in the mucous membrane of the duodenum. They should therefore be given in solution by the mouth.

Epsom salts is frequently given to relieve impaction of the rumen, but it does not always operate satisfactorily. Cases have been observed in which the animal was purging from this drug while the rumen remained impacted and the wall was inactive. When tartar emetic was administered the wall of the rumen began to contract and the impaction was overcome. If the saline

purge is repeated in such cases it may only have the effect of irritating the abomasum (fourth stomach) and the small intestines, setting up a gastrointestinal catarrh or gastroenteritis. In pronounced or extensive impaction it is advisable, however, to give a pound of Epsom salts with the first dose of a ruminatoric, to help to clear a way through the intestines, but the salts should not be repeated.

Tartar emetic is one of the best ruminatorics, but the depressant action on the heart and blood vessels produced by large quantities may cause collapse, and therefore, if it is necessary to continue stimulation of the rumen after three or four doses have been given, it is advisable to change to one of the ammonia preparations or one of the other ruminatorics. Caffein, by increasing reflex activity, renders the rumen more susceptible to the action of the ruminatorics which act through the duodenum. It is also a heart stimulant, which makes it especially suitable as a synergist to tartar emetic. Caffein is most economically administered to cattle in the form of coffee, a quart of good, strong coffee being given twice daily. Coffee also contains tannic acid, and as tartar emetic is incompatible with this substance, the two must be given separately an hour or two apart. The dose of tartar emetic should be given dissolved in a quart of water, and in preparing this drench hard water should be avoided, as the alkaline carbonates it contains decompose tartar emetic. Despite the conditions which must be observed in using it, tartar emetic is probably the most satisfactory ruminatoric we have. In those incipient cases of impaction in which the only apparent symptoms are cessation of rumination and loss of appetite, three or four doses of tartar emetic ($2\frac{1}{2}$ drams three times a day) are usually all that is required to get the cow back to normal.

Vigorous massage will assist in restoring activity to the walls of an inert rumen. This is applied by kneading the rumen through the walls of the left flank with the fist. Exercise is also of assistance, especially in those cows which are continually confined in hot, stuffy stables. Cutaneous irritation by liniments has the effect of stimulating gastric and intestinal peristalsis reflexly.

When movement has been established in the wall of the rumen and the impaction removed, stomachics should be administered and the other treatment suspended.

In those cases which for various reasons may not respond to the above treatment, rumenotomy must be resorted to.

BOVINE STERILITY AND ITS TREATMENT¹

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IN DISCUSSING this subject we shall not attempt to tell anything new. We shall refrain also from rewriting and rehashing the volumes of reports that have been written upon experimental work. Neither has it seemed necessary to go into the detailed anatomy of the parts concerned, as these facts are a matter of textbook record. So the thought—and we hope the happy thought—occurred to us that we present the subject of abortion disease from our own viewpoint, as we have found it in our own territory in Idaho, along with the methods we have used for its control. Not that these reports and methods are unusual, radical or new, but rather that they are actual local conditions which we think are typical, and the methods we consider practical.

The conditions alluded to are many and varied. However, they are constant enough, we believe, to constitute a definite disease, which we have chosen to call abortion disease. It seems also that this nomenclature is being generally adopted by the profession.

Abortion disease is a subacute and more often chronic disease of the generative organs of the bovine and perhaps other species of animals. It is manifest by premature expulsion of the fetus, retained placenta, metritis, mastitis, sterility, and certain diseases of the new-born. It is caused by infections of the reproductive organs. The primary infection is quite generally conceded to be the bacillus of Bang. However, some investigators seem to show that many other organisms, especially the pus-producing ones, enter into the field and at times seem to be the primary and only infections present. A vibrio has been isolated and blamed by some as the cause. Whatever the causative factor or factors may be, it is generally acknowledged that the disease is transmissible from one animal to another, the main source of infection seeming to be through the digestive tract on contaminated feed. We can not concede that this is the only source of

¹ Presented at the second annual meeting of the Idaho Veterinary Medical Association, Boise, Idaho, May 11, 1922.

infection, however, and consider the bull a factor in transmitting the disease from one cow to another, and possibly a carrier of infection within himself. This we will take up more in detail when discussing the bull.

The disease is quite generally distributed in our territory, and reports seem to indicate that it is as prevalent in other States as in Idaho. The yearly losses from this disease in milk production and in calves are variously estimated by different authorities. Hadley of Wisconsin estimates an annual loss of \$3,637,000 in that State alone. We are not going to make an estimate for the State of Idaho except to say that we consider 20 per cent of the cows in our territory to be actively infected at the present time.

The reproductive organs of the cow consist of the vagina, cervix, uterus, Fallopian tubes, and ovaries, also the mammary glands, each of which must be in a healthy, noninfected and vigorous state and functioning properly before pregnancy can take place and be carried to a successful termination. A diseased condition of any one or more of these organs will produce either sterility or abortion or both. It seems to us that the first essential in the study of this work is to gain a thorough knowledge of the normal organs, for if the normal and healthy is not understood, how can one expect to recognize the pathological? In this part of the work we have been greatly benefited from specimens furnished by our local abattoirs.

Owing to the fact that each one of the above-mentioned organs has a definite function to perform in the cycle of reproduction, and that these functions are each distinct, yet all leading to the same end, the symptoms are varied according to the organs affected; still the one outstanding symptom is always the failure to reproduce normally. Since such a variety of causes can bring about the same general symptom, we think it quite essential to make a thorough examination of each animal and to have the most accurate record possible of each individual, not only as to the condition at the time of examination, but all the reliable history that can be obtained. A record should be made of this and preserved and studied so that a correct diagnosis can be made and proper treatment applied to each individual case. We believe that we can illustrate best by giving

you a few reports of herds that have been under our supervision for some time.

Herd No. 1.—In May, 1920, we undertook the supervision and treatment of a herd of purebred dairy cattle, and found the following conditions present: There was at that time only one calf on the farm that was less than six months old. Every cow and most of the virgin heifers had a purulent discharge from the vulva. The general condition of the herd was unthrifty.

We carefully examined 32 of the mature cows and found 15 pregnant, 3 with pyometra and the remaining 14 sterile. The most common lesions found in the sterile cows was a cervicitis and a granular purulent vaginitis, with one, an old cow, showing also a tubular trouble and an atrophy of the ovary on the right side.

The owner was positive that there had never been an abortion in this herd. However, upon close examination of his breeding records it was found that several cows had passed over periods of from two to four months without showing estrum, then had come in quite regularly thereafter, and finally he remembered one heifer that had had a very small string of material hanging from the vulva one morning, and that this same heifer had come in heat a few days later for the first time in three and one-half months. However, we did not consider the "slinking of the calf" was the big problem in this herd, but rather the sterility phase of disease.

The general outline of treatment was to clean up and keep clean. So daily irrigations of all cows and heifers were directed. A 1 per cent cresol solution at body temperature was used. Weekly examinations of all unbred animals were made. During these examinations such treatment of uterus and ovaries was given as seemed advisable; atonic uteruses were massaged, cystic and retained corpora lutea were taken care of, and stubborn cases of cervicitis treated. After about two months of such treatment the purulent discharge from practically all the cows had subsided and the general condition of the herd had improved. Instructions were then given to breed all clean cows. A young and clean bull was used, and pregnancies began to result.

Of the 8 virgin heifers in this herd, all showing the same vaginal symptoms as the cows and treated the same, 5 conceived on

the first breeding, 2 conceived after 3 services each, and one has never conceived.

Of the 14 sterile cows, two never did "settle in calf," one of them showing a cicatricial cervix and the other developed a slight pyometra which did not respond to treatment. Both were sold to the butcher. The other 12 cows have all conceived, and those whose time is up have given birth to healthy calves.

Of the 15 pregnant cows at the time of the first examination, each has given birth to a normal calf. There has not been a retained placenta. One case of pyometra has developed and some calf scours has prevailed. It has been our policy to have each cow irrigated daily for a time after calving, as this seems to aid materially in getting them to conceive later on.

In December, about seven months after we had undertaken the treatment of this herd, it was noticed that pregnancies were not taking place as constantly as in the previous months, and a little of the purulent discharge was reappearing from some of the cows; so another herd examination was made to determine the reason, if possible, for the apparent sterilities. At this time the early pregnancies were diagnosed and made note of, as well as other findings. In summing up the records after the examination it was noted that the reappearance of the old cervicitis and vaginitis were the prevailing symptoms in the cows that were failing to breed. After a period of vaginal irrigations, pregnancies were still not as numerous as they should have been, although the cows had responded well to the treatment. So the bull was examined and found to be at fault. He will be discussed later. In March three abortions had occurred at two to three months of gestation. Two of these were diagnosed by rectal examinations before and after aborting, and one was observed by the owner. It was then noted that these abortions occurred in the last three cows to conceive to this bull. There has not been time enough since changing sires to say definitely how rapidly conceptions have taken place since this last misfortune.

Of the four cases of pyometra occurring in this herd, three at the time treatment was undertaken and one since, two have been sold to slaughter as hopeless and the other two are ready to breed. So in summing up the results of work on this herd in

terms of percentages for production, we have the following showing:

At the time treatment was started milk production was about 40 per cent of normal, and calf production was about 35 per cent, or the herd was not paying for its hay. There have been lost as hopeless to treat 4 cows and 2 bulls. At present the production stands about as follows: Milk production, 85 per cent; living calves, 60 per cent; pregnancies, 20 per cent; cows not bred, 5 per cent. Or the herd is now running about 20 per cent below normal in calf and milk production. We think this is an illustration of what can be accomplished by sanitation and herd supervision.

Herd No. 2.—This is a herd of purebred beef type cattle, and we find conditions somewhat different, although the same general complaint: that is, the lack of production was the dominant factor in the mind of the owner. Supervision of this herd was started about six months ago. There are 30 cows and 3 bulls under treatment, or have been under treatment during this time.

A summary of the history runs about as follows:

Fourteen of the cows were thought to be in calf at the time they were sent to pasture in May, 1921, and were not known to come in heat until early fall and winter, and showed estrum quite regularly but failed to conceive. Ten cows had given birth to healthy calves during the summer, but failed to breed. Four were virgin heifers that refused to get in calf, and two were cows that had failed to breed the previous year. To the owner's knowledge there had not been an abortion in the herd. There was no visible discharge from any animal.

Careful examinations by vagina and rectum revealed a cervicitis quite constant and generally an atonic condition of the uteruses, with some minor ovarian troubles. Three cases showed a slight purulent discharge from the uterus at the second and third treatments by massage. All the cows under treatment were isolated and given hot saline irrigations daily by the owner, and we saw and treated them at intervals of about ten days or two weeks. These treatments consisted of uterine massage where indicated, and uterine douches with 1 per cent Lugol's solution where an infection of the uterus indicated it. Also these examinations served to determine the progress of each animal, and when one was found that seemed clean and vigorous the fact

was noted on her record and she was turned out with the healthy cows and bred.

During this time it has been possible for us to diagnose three abortions in this herd by finding the cows pregnant at six to ten weeks and then finding the uterus empty. So again it is difficult to say which phase of the disease is mostly to blame for the breeding trouble, whether it is sterility or abortion or both, and where to say the one quits and the other begins. Nevertheless, a summary of the conditions in this herd on April 15 runs something like this: Three unseen abortions have occurred in cows that have gotten pregnant after being treated. Two cows that had not been treated have retained their placenta, after normal calves, and have been treated accordingly.

There are 16 pregnant cows now, and 10 not yet ready to breed; also four that seem to be really sterile. Of these four, one is a virgin heifer whose cervix is occluded by scar tissue. One is an old cow showing nothing but a long almost lifeless uterus that does not respond to massage, but as yet has no pus in it. The other two show tubular trouble and are probably hopeless.

We hope that the reporting of these two herds will serve the purpose of this paper so far as the female of the species is concerned, and beg now to call attention to the influence that the bull may have on abortion disease.

In our "good old college days" we were taught that the bull is one-half of the herd, and to our knowledge this statement has never been seriously disputed by authorities on the subject but is acknowledged as a fact. Since the sire is one-half of the herd from a breeding standpoint, why overlook him as a factor in the transmission of the diseases of the reproductive organs?

The organs entering into the field of reproduction in the bull are the sheath, penis, testicles, epididymis, seminal vesicles, prostate and Cowper's glands, each of which must be in a healthy and normal state in order to produce a viable semen.

Unfortunately not all of these organs are accessible for manual examination as readily as the genital organs of the female are. However, the testicles, epididymis, cord and penis with its sheath are quite easily examined, so it is therefore possible to recognize many of the gross changes that take place in them from diseased conditions. The prostate and Cowper's glands

are so hidden in the pelvic cavity that physical examination of them reveals very little unless they are greatly enlarged. Hence the examination of the bull usually consists of the palpation of the testicles, epididymis and penis and observation of the sheath. The finding of any one or more of these organs affected warrants the withdrawal of the bull from service until such time as the condition is corrected. Failing to find lesions on such an examination, however, does not warrant one in concluding that the animal is healthy and fit for use, for it is very possible for an infection that would destroy fertility to exist in one of the organs not palpated, or even in one of those examined, and that infection not to be developed far enough to cause a gross lesion. Hence the surest and most satisfactory way to determine the potency of the bull, we think, is to examine the semen, for it is the vital product and the one necessary thing so far as the bull is concerned to produce a proper fecundation of the ovum. So any change from the normal should be regarded as sufficient reason for the lack of potency, the degree of impotency depending somewhat upon the amount of divergence from the normal.

We have alluded to a pathological condition found in a bull in herd No. 1, and wish to report this case more in detail. This animal was put into use in June, 1921. A clinical examination at that time revealed only the normal. He had been used on a few heifers previously, and pregnancies had resulted, so he was considered clean. As stated before, conceptions began to take place as soon as this animal was used on cows that had responded to treatment. This continued for about five months, when again our records began to show a few nonbreeders among the cows. A little later some abortions occurred at about the third to fourth month of gestation. Then the bull was suspected, although he did not show any abnormal condition upon clinical examination. So two samples of semen were taken from two services a few minutes apart. The first sample from gross appearance seemed to be nearly all pus, and the second one looked to be about one-third pus. Microscopic examination was made at once of the second sample to determine the motility of the sperm cells. This showed about 20 per cent of them not motile. A laboratory examination was made in two hours after the samples were taken with the following results:

- 20 per cent of the sperm cells were still motile.
- 10 per cent were imperfectly formed, including small heads, no nucleus, short or curved tails.
- 3 per cent degenerated heads, making a Y-shaped cell.
- 1 per cent headless tails and
- ½ per cent tailless heads.

Bacterial examination showed in the first sample numerous *Bacillus coli* and about one-fourth as many streptococcus. The second sample showed a few colon bacilli and numerous *Streptococcus pyogenes aureus*.

A sample of the vaginal secretions of the cow used in this work was taken before she was washed for the service, and a laboratory examination of this showed a few *B. coli* and numerous small micrococci, which did not develop in the incubator.

So we conclude that this bull was ejaculating real pus of a virulent nature and very likely is hopeless as far as future breeding is concerned.

The case just reported is the most outstanding example in our experience. However, we have discarded several other bulls from herds under our supervision. On clinical evidence of disease, one in herd No. 2 was taken from service, when on examination the epididymis was found to be hard and enlarged. Another in a herd not reported in this paper was discarded on the grounds of old age and a pus discharge from the sheath. However, we do not deem it sufficient merely to discard one bull and replace him with one that looks clean, but recommend so far as possible the frequent examination of the semen of a bull used where breeding troubles exist. By this method we think it possible to detect the early appearance of infection in the bull and by so doing avoid much trouble that otherwise might occur.

The foregoing reports are believed to be sufficient to give a general idea of the conditions found in the average herds that have been brought to our attention, so instead of presenting further case reports we will attempt to outline a method of treatment which we believe if followed for a sufficient time will give definite results in the control of the diseases of the reproductive organs of the bovine.

There is, we believe, no panacea for the cure of any or all of the conditions associated with abortion disease. However, it is possible, by a definite program of cleanliness, sanitation and prevention, conscientiously carried out, to prevent, control

and even suppress the disease and maintain a herd of breeding or dairy cattle on an efficient production basis.

So long as the causes of this disease are still being sought, the problem of eradication is a difficult one indeed. Therefore it seems to be rather an economic problem for each individual herd; hence a method of herd supervision seems the logical solution. It has been our plan to make a careful and thorough examination of each individual, and to preserve a record of the findings along with her history; then to classify the animal as to condition and treat accordingly.

Those showing cervicitis, vaginitis or pyometra are daily irrigated with hot saline solution. Atonic and septic uteruses are irrigated and massaged at intervals of one to two weeks, as their progress indicates. Diseased ovaries are treated according to indications, and of course those individuals not considered amenable to treatment are culled from the herd.

Too much stress can not be placed on an accurate record of each individual, which includes her former history, as well as the conditions found at each examination, and her œstral dates. Thus one is able to follow accurately the progress or lack of progress she is making and to know what condition to expect in the ovary and uterus, if they are normal on the date of successive examinations.

We believe there is danger of overtreatment, especially of the ovaries. However, by carefully watching each animal and not breeding until she has a healthy, noninfected uterus, and then breeding to a healthy, noninfected bull, we are then, and then only, entitled to expect to get a normal, vigorous offspring.

We wish to acknowledge the valuable assistance given us by E. R. Dooly, bacteriologist, of Twin Falls, who did all of the laboratory work reported in this paper.

Country Gentleman, in a leading article on tick eradication, says: "And today the real problem facing State and Federal authorities is not the annihilation of the cattle tick, but the winning over of that 1 per cent of people who can, if they will, keep the red stains on the quarantine map well-nigh indefinitely."

TECHNIQUE OF TUBERCULIN TESTING ¹

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MOST DISCUSSIONS of tuberculin tests are confined to efficiency of results rather than the importance of uniform technique.

The tuberculin test is a scientific operation, depending for efficiency upon careful technique and interpretation and the closest observation of the animals. It is not a mechanical process by which any one who can make a hypodermic injection or read a thermometer can obtain satisfactory results.

THE VETERINARIAN

The veterinarian is an important factor in tuberculosis control work. He must be familiar with all phases of tuberculosis, its cause, its nature. He must know something of the pathology, and what kind of lesions are produced, in what part of the animal's body the lesions may be located, through what channels the organism is likely to enter and to be discharged. He should also be able to recognize the physical symptoms of the disease, as well as the manner of spread, and understand the best preventive measures for combating it. With these facts, and having a thorough knowledge of the application of the tuberculin test, he is qualified to use this test as a method of control in freeing infected herds from the disease.

TUBERCULIN TESTS

The three tuberculin tests generally recognized are the subcutaneous, the ophthalmic, and the intradermal, the intrapalpreal being considered an intradermal test.

GENERAL INSTRUCTIONS

When a tuberculin test is to be made, the owner of the cattle should be notified several days in advance of the time set for the test on his herd, and requested to have his cattle stabled a few hours prior to the time the veterinarian will arrive and

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have available all data pertaining to the herd. Assuming that these arrangements have been made, the veterinarian must be prompt in keeping the appointment, and immediately upon arrival at the farm should discuss with the owner the contract under which the test is to be made. It is important that the owner should understand just what will be required of him, and know the benefits he may derive. A thorough understanding between the owner and the veterinarian should be had before proceeding with the test, as this may avert dissatisfaction later. The owner's future attitude toward tuberculosis control work, whether it is to be favorable or otherwise, may depend largely upon his impressions of the veterinarian's manner and methods. For this reason the veterinarian should be agreeable, careful in every detail, and considerate. Tact and consideration are usually successful in establishing respect and confidence in the man and his work.

The history of the herd should now be obtained—where the animals originated; whether previous tuberculin tests have been made of the herd or of any of the individuals; whether any animals have been sold or slaughtered or have died recently, and the cause. The number of animals in the herd should be obtained, and a physical inspection of the animals made to detect tuberculosis or any other diseases or conditions which might influence the accuracy of the test. Arrange with the owner at this time for all help that will be needed in handling the cattle during the test.

Errors are so likely to occur in handling large herds that the only safe way is to formulate a plan of work, and adhere strictly to it. The animals should be arranged in the stable in the manner most convenient. Give each animal a stable number corresponding with the stall number, record it as well as the herd number, registry number, name, date of birth or approximate age, sex, and brief description. These points of identification of each animal must be established and recorded before proceeding with any tuberculin test.

THE SUBCUTANEOUS TEST

Special Instructions

Before proceeding with the test the owner should be instructed as to the care and management of the herd during the test.

1. The amount of feed, including roughage, should be materially reduced in dairies which are fed heavily, and feeding should never be done directly before the time for a temperature measurement.

2. Watering.—Where individual drinking cups are not provided, it is best to water the animals immediately after the tuberculin is injected, and when it is possible they should be allowed small quantities of water often, but never immediately before taking a temperature.

3. Ventilation should be regulated to secure as far as possible a moderate temperature. A record of the barn temperature should be kept.

4. Milking should be done as usual.

5. Stables should be kept clean.

6. No animals should be moved without the permission of the veterinarian.

Technique of the Test

Before beginning the test the veterinarian should provide himself with clean over-garments and disinfected rubbers or boots.

In applying the subcutaneous test, at least three preliminary temperatures are taken two hours apart, and recorded with the date and hour on the temperature sheet. The thermometers used must have been standardized by the United States Bureau of Standards, and must be clean and disinfected. They should be lubricated with a nonirritating oil containing a small amount of nonirritating disinfectant, and be inserted well into the rectum, remaining in the animal at least two minutes. A five-inch thermometer seems to give the best satisfaction.

The injection of tuberculin should be made immediately after reading the last of the preliminary temperatures, provided they have been normal. No animal with a high or irregular temperature should be injected. The dose of tuberculin used should depend upon the age and weight of the animal, and whether any previous test has been made within a short time. The dose of U. S. B. A. I. tuberculin under usual conditions is from 2 to 6 c.c. In retests or with suspicious animals larger doses are recommended. The dose of tuberculin used and time of injection should be recorded on the sheet.

For the injection use either a 6 or 10 c.c. syringe with screw needles $\frac{1}{2}$ to $\frac{3}{4}$ inch in length, 16 gauge. The syringe and

needles should be sterilized before beginning the test, and the needle is disinfected after each injection. The point of injection is either the side of the neck, or the soft skin back of the elbow. The injection is made subcutaneously and not intramuscularly. The skin is raised with one hand, and the injection made quickly but carefully with the other. Disinfection of the skin at the point of injection is generally recommended, though it is a question whether it is effective; but the disinfection of the needle before each injection is of the utmost importance.

Post-injection temperature measurements should begin at the eighth hour after injection, and be continued at two-hour intervals until the eighteenth hour at least. But when the temperature of an animal is rising, the measurements must be continued until there is a definite reaction, or until the temperature begins to fall. The temperature of any animal showing a definite rise should be checked with another thermometer. When using large doses of tuberculin or in retesting, the temperature measurements should be taken as early as the fourth or sixth hour after injection. All temperature readings must be recorded immediately on the temperature sheet, with the date and hour of the measurement.

Interpretation of Results

For years a gradual rise of 2 degrees or more above the preliminary temperatures, followed by a return to the normal, was considered a reaction, but for accuracy we can not be guided entirely by this rule. We must consider the history of the herd, the age and condition of the animal, and the extent of disease in the herd. Care and judgment must be exercised in deciding the results of the test, as it is often difficult to interpret a reaction. A reaction is not simply a sudden rise in temperature for a short time, but is a gradual rise, with a high temperature for a period of at least two temperature measurements (it may be longer), then it recedes slowly, thus forming the typical curve of a reaction, which is the most important indicator for the interpretation of the test. The rise of temperature in reacting animals varies from 1 to 5 degrees or more above the normal temperature of the individual. A thermic reaction is often accompanied by a physical reaction, which may be manifested by a roughened coat, a chill, depression, diarrhea, or, in some cases, loss of appetite.

An animal during a test may give a rise in temperature from

causes other than tuberculin, which may be mistaken for a reaction. For this reason it is necessary to study carefully all elevations of temperature before finally deciding that an animal is a reactor. The results of the test should be recorded on the temperature sheets in the following manner: N, indicating negative; S, indicating suspicious; P, indicating a positive reactor.

Various Influences Which May Affect the Reliability of the Subcutaneous Test

1. Driving or moving the animals any distance in hot weather.
2. Direct rays of the hot sun on an animal.
3. Close and badly ventilated barns.
4. Exposure to cold drafts, and subsequent chilling.
5. Depriving the animals of water during the test, or, conversely, permitting them to drink large quantities of cold water.
6. Allowing bulls to be used for service during the test.
7. Cows on official milk record test, or excessive bagging of cows.
8. Repeated or recent tuberculin tests.
9. Changes in feeding and attendants may affect nervous cows.
10. Animals which have never been tied or confined, or those which have been on pasture for some time, when stabled for the test frequently show irregular temperatures.
11. Animals with acute indigestion.
12. Animals affected with metritis, mammitis, hemorrhagic septicemia, actinomycosis, or any condition which might carry a high temperature.
13. Some animals normally show an elevation of temperature at feeding or milking times.
14. Chronic bullers often show erratic temperatures.
15. Recent or repeated injections of tuberculin may produce tolerance.
16. Oestrus, springers and calving are normal functions and should not be accompanied with any elevation of temperature.

THE INTRADERMAL TEST

Many of the instructions and conditions necessary for the proper application of the subcutaneous test are not required in making the intradermal test, but the identity of each animal should be thoroughly established and recorded (as described under general instructions) before proceeding with the test.

Technique of the Test

It is necessary to restrain the animal only at the time of injection and when observations are to be made. The site of injection generally used is one of the subcaudal folds, which is cleansed with a 60 per cent solution of alcohol. *Cleanliness* is one of the most important factors in this test.

We prefer for this work a 1 c.c. glass syringe with a screw needle $\frac{1}{4}$ or $\frac{1}{2}$ inch in length and 25 gauge. The syringe and needles are sterilized before beginning the test, and the needle after each injection is disinfected with 60 per cent alcohol.

The dose of tuberculin is 2 to 5 drops. If this is properly injected, a nodule about the size of a small pea will appear at the point of injection.

In making the injection we stand directly behind the animal and grasp the left subcaudal fold between the thumb and first finger of the left hand. The needle attached to the syringe is slowly inserted the full length into the dermal tissue, taking care that it is between the layers of skin, and not through them. Do not have the point of the needle too close to the surface of the skin, as superficial injections into the epidermis will not give as definite results as true intradermal injections. The needle should be slowly withdrawn after the injection, thus preventing any loss of the tuberculin. The point of injection in a normal subcaudal fold is the most dependent part, but when this fold is loose and flabby the injection should be made where the fold joins the under surface of the tail, as in flabby folds the reactions are diffuse and not definite. In most animals a swelling will appear at the point of injection within an hour after the tuberculin is injected, but this is of no diagnostic value.

Observations should be made at the seventy-second and ninety-sixth hours after injection, or later.

Interpretation of Results

Consideration must be given not only to the size, but to the character, shape, general appearance and location of the local swelling. A small, hard nodule, not larger than a small grain of shot, often appears at the point of injection, but is not to be considered as a positive reaction. So much depends upon the methods pursued and the judgment of the operator that in the hands of a careless or inexperienced operator the results of the

test may not be reliable. Some operators are too prone to snap judgments. All operators should receive practical instructions in applying and interpreting the intradermal test if accurate results are to be obtained. "Experience is the best teacher."

In recording the results, use the code adopted by the United States Live Stock Sanitary Association as follows:

1. Animals showing no reaction shall be recorded at each observation as N (negative).

2. Reactors shall be recorded as follows:

(a) For circumscribed swellings, pea size (diameter 3/16 inch) shall be used as a basic standard and recorded as P-1. Larger swellings shall be recorded as P-2, P-3, P-4, P-5, etc., in accordance with the findings, being two, three, four or five times the size of a pea.

(b) For diffused swelling, "Thick 2-X" shall be used as the basic standard and signifies a diffuse swelling in which the injected caudal fold is twice as thick as the normal fold. Larger swellings shall be recorded as Thick 3-X, Thick 4-X, etc., in accordance with the findings.

Thermic reactions follow intradermal injections more often than is generally supposed. These reactions occur any time between the eighth and twentieth hours after injection.

The accuracy of the intradermal test may be affected by—1. A careless or improper injection. 2. Using a syringe and needle which have not been properly sterilized. 3. Using a tuberculin not specially prepared. 4. Injecting into an unclean subcaudal fold. 5. Using too much force on the syringe in making the injection. 6. Pricking the skin a number of times with the needle while attempting to inject. 7. Making the injection in a loose, flabby fold. 8. Using strong chemical disinfections on the fold before making the injection. 9. Pinching or bruising the fold. 10. Making careless readings of the results without due regard for the proper period of time after the injection. 11. Recent or repeated injections of tuberculin may produce tolerance.

THE OPHTHALMIC TEST

The ophthalmic test, while not recognized as an official test when used alone, is a most valuable adjunct to the other tests. It can be used at any time, or in any combination, without

interfering with the efficiency of the other tests or having its own results modified by their influence.

Technique of the Test

As in the other tests, the identity of each animal must be established and recorded. Examine the eyes for any abnormal conditions, and do not apply the test to animals which show any local inflammation of the eyes.

Ophthalmic tuberculin is prepared in both disc and liquid form. In applying the liquid, a curved glass dropper, with an outlet as small as possible, is preferable. The animal's head is held by an assistant in such a position that when the operator instills the tuberculin on the eyeball it will be diffused at once over the entire surface of the eye. Close the eyelids with the hand for a few seconds, to prevent escape of the tuberculin.

In instilling discs, clean hands with short, smooth nails are necessary. A disc should be placed between the thumb and first finger. The animal's head must be held by an assistant in such way that the operator can, with his thumb, place the disc well back on the eyeball, under the upper lid, and toward the outer canthus of the eye. The hand should then be placed over the eyelid for a few seconds, until the disc dissolves.

In making an ophthalmic test the eye must be sensitized with 2 or 3 drops of a 4 per cent solution of tuberculin, or one disc when that form of tuberculin is to be used. No records of the results of this sensitization are usually made, although sometimes a distinct reaction occurs. Three or four days after the eye has been sensitized, apply 2 or 3 drops of 8 per cent solution of tuberculin, or 2 discs. Observations should be made at the third or four hour after the instillation of the tuberculin, and continued every two hours, until the twelfth or fourteenth hour.

Interpretation of Results

The following code is used in recording the ophthalmic test:

1. Animals showing no reaction shall be recorded at each observation as N (negative).
2. Reactions shall be recorded as follows: Small amount of pus, P-1; much pus, or a distinct purulent discharge, P-2; abundant pus, combined with hyperemia of the conjunctiva and swelling of the lids, P-3.

In observing the results of the test, do not be confused by a

slight, white mucous discharge that often occurs soon after the tuberculin has been instilled.

Observations must be made at frequent intervals, as the animals often destroy the evidence of reaction by rubbing the eye.

In shipped cattle this test is often unreliable, because of exposure, contagious ophthalmia, or foreign bodies in the eye.

When tuberculous animals do not react to any of the tests, the disease is either arrested, or advanced, or in the incubative stage.

DISPOSAL OF REACTING ANIMALS

At the completion of any test the owner should be notified of the results, and all suspects and reactors must be quarantined and tagged for identification. In Pennsylvania we also use a form describing and diagramming the animal—a form similar to those used by registry associations. If the owner elects, the reactors are appraised by an agent of the Bureau, and the owner is requested to arrange for their slaughter. When these arrangements are complete, a permit is issued for the removal of the reactors to the slaughtering establishment where they are killed, and postmortems are made supervision. A report of the finding is submitted to the central office.

POSTMORTEM EXAMINATIONS

Extreme care must be used in making postmortems, as too often lesions are overlooked. In cases where the lesions do not appear to be characteristic of tuberculosis, specimens should be submitted to the laboratory for examination.

The importance of a searching postmortem examination was shown recently when examining a large number of reactors. In one of the animals the most definite lesion found was in a skin lymphatic gland between the ribs. In a second animal the only lesion was a caseous preescapular lymphatic gland, while in another animal one of the sublumbar lymphatic glands was caseous, although this was not the only lesion in the carcass. Laboratory examination confirmed all of these lesions.

CLEANING AND DISINFECTING

This phase of tuberculosis eradication is too often neglected.

It is the duty of the veterinarian to make a careful inspection of the barn and its surroundings, to advise the owner of any defects in sanitation, and to outline preventive measures.

Upon the completion of a tuberculin test, where reactors have been found, the veterinarian should instruct the owner in every detail of cleaning the premises, which should be done immediately following the removal of the tuberculous animals. The disinfecting should be done under the direction of the Bureau or Board.

In Pennsylvania disinfection is considered of such importance in the work of tuberculosis eradication that the State has trained agents who supervise the disinfecting, and also furnishes an officially approved disinfectant free of charge.

COMBINATION TESTS

The subcutaneous, intradermal and ophthalmic tests are not infallible when applied independently, but will give more accurate results when applied in combination.

Now that the tuberculin tests in combination have been approved as one of the final tests before a herd is accredited as free from tuberculosis, it is suggested that care and judgment be used in the selection of the order in which the tests are to be applied.

A combination of either two or three tests may be used. In a double combination the tests most frequently used are the subcutaneous and the ophthalmic, or the intradermal and the ophthalmic, but the intradermal and subcutaneous combination is also used.

In the triple combination, of course, all three tests are used, but the efficiency of each test depends upon the order of their application.

In describing the order of application of the tests in the triple combination I will refer to them as Combination A and Combination B.

Combination A is a combination of all three tests applied as follows: At the time of the injection of the intradermal tuberculin one of the eyes is sensitized with ophthalmic tuberculin. At the seventy-second hour after the injection of intradermal tuberculin the first observation of the results of the intradermal test is made, and at this time the first preliminary temperature for the subcutaneous test is taken, and the test is then made and recorded in the usual manner. The final instillation of ophthalmic tuberculin is made at the time of injecting the subcutaneous

tuberculin. The usual observations of this test are made, and at the completion of the subcutaneous test the results of the intradermal test are again observed. At this time the final results of all three are recorded. This order of application is very favorable to the intradermal and ophthalmic tests, and excellent results are obtained.

The results of the subcutaneous test are unsatisfactory, because of the interference of the intradermal test. This can readily be accounted for, as in many tests there is a thermic reaction in animals from the injection of tuberculin intradermally, and it is only reasonable to believe that when animals give marked thermic reactions to the intradermal test, they will not react with any degree of certainty to a subcutaneous test applied in less than three days after they have reacted thermally to the intradermal test. For this reason when Combination A is used it is rare, if ever, that any animals react to the subcutaneous test only.

The results of the ophthalmic test in this or any other combination are not interfered with by any of the other tests.

Combination A in detecting reactors is apparently satisfactory, but the results are often confusing and difficult to explain to the owner.

In Combination B, intradermal and subcutaneous tuberculin are injected simultaneously and the sensitizing dose of ophthalmic tuberculin is instilled in the eye. The results of the subcutaneous injections are recorded at the completion of that test. Observations of the intradermal results are made at the seventy-second hour after the injection, at which time the final ophthalmic instillation is made. That test is carried on in the usual manner, and the results recorded. A second observation of the intradermal results is made at the ninety-sixth hour, and recorded, which completes the simultaneous test.

The best results are obtained in this combination from the subcutaneous test, which evidently interferes somewhat with the results of the intradermal, though not to the same extent that the intradermal injection influences the subcutaneous in Combination A.

The facts presented in this paper are deductions from field experience in herds where it was possible to conduct the work under conditions favorable to accuracy.

A COMPARATIVE STUDY OF HUMAN GRIPPE AND CONTAGIOUS PLEUROPNEUMONIA OF THE HORSE (EQUINE GRIPPE)

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I. INTRODUCTION

MYSTERY has reigned for decades concerning the nature of the affection called contagious pleuropneumonia of the horse, a mystery which is analogous to that concerning Spanish grippé.

It is recognized that Spanish grippé is not a new disease. It is identical with the pandemic influenza of 1889-91. As for contagious pleuropneumonia of the horse, the origin of the different names for the disease, such as influenza pectoralis, contagious pleuropneumonia, Brustseuche (German), etc., is not known. These different names specify a lesion of the thoracic organs. But the change in the pectoral organs is not related to the symptomology of contagious pleuropneumonia, no more than pneumonia is the consequence of the normal course of human influenza, or measles, scarlatina, whooping cough, articular rheumatism, diphtheria, or other diseases.

In the different human maladies just mentioned it is not unusual to see some pulmonary localizations as the usual causes of death. This is true in the so-called pleuropneumonia of the horse. The pulmonary and pleural changes are only secondary; thus it is unreasonable to designate them by the names of the complications which may occur, as is the custom.

People have always been interested in the secondary pulmonary lesions which are considered as specific. That is the reason, I believe, why, although some eminent bacteriologists have concerned themselves with the question, they have arrived at only insignificant results. Clinicians have always named, described and treated diseases according to the symptoms or com-

¹ From the *Revue Generale de Medecine Veterinaire*, vol. 30, p. 378 and p. 441, 1921.

plications which they manifest. Every microbiologist has looked for a microbe. In case of intestinal disorder, sometimes the thoracic organs and most often the lungs, sometimes the pleura, the heart or the pericardium were secondarily affected, either separately or at the same time; or, although some cutaneous or cerebral symptoms were manifested, different names were given and different pathogeneses were attributed to the affection, but its exact nature was misconceived. From this misconception originated the idea that a pulmonary inflammation belonged to the symptomatic picture of the disease. In case the pulmonary inflammation was lacking, the affection was quite simply considered as averted, or it was even likened to typhoid fever.

Dieckerhoff is principally the creator of this confusion, because he placed typhoid fever and pleuropneumonia of the horse in the same group. He classified the two diseases under the names of influenza catarrhalis and influenza pectoralis. He also recognized, as a special affection of the respiratory system, a diffuse infectious bronchitis with a subacute progress (scalma), an infectious and quite endemic laryngitis. All this was the cause of a confusion to which is due the polymorphous picture of the so-called contagious pleuropneumonia.

It is only in the latest edition of the "Traité de Pathologie et Thérapeutique Spéciale des Animaux Domestiques," by Frohner and Zwick, in 1919, that Zwick treated typhoid fever and the so-called contagious pleuropneumonia as two characteristic diseases, etiologically different.

I have been able to make an exact valuation of the nature of contagious pleuropneumonia of the horse, thanks to —

(1) The thorough study of typhoid fever (influenza catarrhalis) pursued for more than two years by means of a stallion (Demi-Monde) which was a carrier of the disease and which possessed the power to infect only at the time of service.

(2) The preventive treatment of horses which had recently arrived at the remount depot, with serum against benign glanders. Before the application of this serotherapy, infectious pneumonia appeared during the course of benign glanders, and vice versa. That was also an important factor contributing to the misconception of the real nature of infectious pneumonia. The mingling of the symptoms in these associated infections is very serious; the production of pulmonary complications is not

rare, as well as death. There frequently appeared, moreover, under the same circumstances, some infection of the blood which occasioned confusion.

(3) The curative treatment of horses attacked with infectious pneumonia, by means of serum which was very powerful against the diplo-pneumo-streptococcus, from which fewer complications resulted.

(4) The early apprehension of the sick by regularly, morning and night, taking the temperatures of all the animals present, as well as by immediately isolating the sick in a stable where they were in the most favorable conditions, in order to reduce to a minimum the danger of complications. Relying on the clinical observations of a very large number of cases, upon bacteriological research, experiments with infection, and analogous medical studies of the contagious affections of the respiratory organs of man, I proposed, in a preliminary communication¹ in 1916, to speak of influenza of the horse instead of contagious pleuropneumonia. I did this to avoid further confusion.

My conviction that this name is exactly appropriate results from the numerous communications relative to human grippé (influenza) which have appeared in Dutch and foreign periodicals. It is from these that I have acquired the certainty that human influenza and contagious pleuropneumonia of the horse are etiologically, symptomatically and epidemiologically absolutely identical.

The equine disease is especially prevalent among young horses of the army. This is notably the case when a large number of young horses are lodged in too small stables, leaving much to be desired from a hygienic point of view. This sudden assemblage of different horses is observed at the time of mobilization. In Holland the disease appeared as early as August 1, 1914, among the cavalry of many of the mounted troops of the field army, and it raged regularly in the depots and field hospitals.

After working in the laboratory for more than two years, with the study of this disease, I had the occasion to study it clinically by remaining at the remount depot.

¹ See references to literature at end of paper.

II. THE SYMPTOMATOLOGIC IDENTITY OF CONTAGIOUS PLEURO-PNEUMONIA OF THE HORSE WITH HUMAN INFLUENZA

Thanks to regularly taking the temperature of all the animals present, permitting an immediate disclosure of the animals affected, I was convinced of the real nature of the disease (infectious pneumonia). From the results obtained, it appears that the method which I followed is absolutely indispensable in the fight against this disease. Even the most minute control, which permits only the slightest alteration in the general condition, may be considered as insufficient. By taking the temperatures several times it was found that an affected animal continued to eat and presented no cerebral depression nor any symptoms at all. When such a subject is not taken from his work and his company, something which does not occur in civilian life, the probabilities are great that a complication of the thoracic organs will be produced before the aid of a scientist is secured. The regular taking of the temperature gave at the same time an idea of the period of incubation.

Symptoms Manifested During the Normal Course of Contagious Pleuropneumonia of the Horse

One of the first characteristics, generally the first, is fever. At two jumps, most frequently in 48 hours, the temperature rises to above 40° C. The period of incubation is then very short; cases are observed where in a few hours the temperature has risen to 40° C. and above, although in the morning it was normal. The progress of the disease is then acute, sometimes very acute. No prodromal stage is observed. The absence of this makes the quick rise in temperature characteristic. The fever progresses along with muscular tremors, shivering, and coldness of the ears and extremities. Generally the temperature remains high for three days (with very slight fluctuations); it may even be very high, 42° C. or more. The thermometric fall is just as rapid as the elevation. It likewise takes place in two drops, so that the temperature will have returned to normal at the end of two or three days. This fall coincides with the amelioration of the general condition. The appetite is recovered, the thirst is diminished; in short, the general infection is overcome. Except in case of a complication, the majority of the sick animals will have recovered in five or six days. The curve of the fever incontestably is of prognostic

value. If important fluctuations are noticed in the rise or fall of the temperature, it is because complications have set in. Temperatures very high at the beginning of the disease are nothing alarming.

The digestive apparatus does not remain entirely normal. Stomatitis is always observed to a slight degree. The tongue is warm, usually tumefied and covered with a ropy saliva. The appetite is affected, the animal takes little or no oats. During the first days certain of the horses continue to eat but do so slowly. Generally it is oats which are first refused, usually on the third or fourth day. At the onset the animals accept more crushed oats and some bran; on the whole they prefer grass. It is also rare to prove that a horse affected with infectious pneumonia continues to eat at all to relieve the anorexia. Drink is taken with avidity. At the beginning of the disease the dung is hard and covered with a gray, yellowish fibrinous coating. After the expulsion of the feces which were in the digestive tract before the subjects were taken sick, the fecal material is of the same nature as in cases of affection with high fever.

From the beginning of the disease the respiration is superficial, irregular and accelerated, the rate varying from 20 to 40; it may reach 50 or more. In the majority of cases there exists a dyspnea of various degrees; the respiratory movements are affected with nostrils wide open. The intercostal pressure sometimes shows some intrathoracic disturbance. Percussion does not permit the recognition of pulmonary lesions, nor auscultation, except a roughness of the respiratory murmur in the main bronchi.

The nasal mucosa is moist, hyperemic and glistening. By the nasal openings are expelled, in small quantities, drops whose color varies from yellow to reddish brown and which dry up in little crusts. In only one case was I able to observe bloody drops. The nasal secretion is generally slight.

The cough is invariable and it is short, superficial, weak, dry, and is heard only intermittently. Its cause is not a laryngitis; this irritative cough is of a reflex nature.

The conjunctiva presents a special aspect, that of a leaden color and glistening; sometimes it has a yellowish hue.

The pulse is variable; at the beginning of the affection it is usually low and slightly accelerated, sometimes irregular, and

on an average 50 per minute. The rate is not always in accordance with the fever.

In addition to the fever, the general appearance, the manner of standing, the weakness and the gait are characteristic. During the febrile period the animals have the appearance of being severely affected. The manner of standing is unsteady; they remain immovable; they hate to change their position; usually they do not lie down. The eyes are completely or partially closed. When walking the weakness of the back is characteristic; the displacements are incoordinate and unsteady, which is considered a pathognomonic symptom. The animal walks as if intoxicated, even after the temperature has returned to normal for several days. This is remarkable after an affection of so short a duration.

During the febrile period some albuminuria is noticed, which disappears at the time of the fall in temperature. The urine contains no sugar but many urates. The micturitions are normal at the beginning of the disease; later there is polyuria.

The vaginal mucosa is hyperemic and secretes a ropy fluid. Local perspiration is frequent.

The course of the disease is remarkable. As has been said, the fever, after having reached its maximum in two bounds, remains stationary for two or three days; it then falls, and the picture of the affection is generally entirely modified. The majority of the sick recover in an average of six days. This favorable termination is observed in a very large number of the sick if they have been isolated immediately in a stable where they find the most favorable hygienic conditions. The above-mentioned symptoms must be attributed, then, to genuine contagious pneumonia of the horse.

It cannot be disputed that the symptomatic picture is identical with that of human influenza with a normal progress. The following will demonstrate that this analogy also exists for the complications which follow.

Just as in human influenza, in the horse also there are numerous alterations in the normal pathologic process. One might thus be inclined upon clinical grounds to make a distinction between the catarrhal or respiratory, gastric or gastroenteric and nervous forms, according to the predominance of respiratory symptoms, gastroenteric symptoms, or even of the nervous alterations. I prefer the differentiation between forms

with a normal progress and those where important modifications are produced. Even when the affection rages in one stable, it sometimes happens that the different forms are found together. It is to that fact that the disease owes its polymorphous character.

1. The rudimentary form, always considered an abortive form of contagious pleuropneumonia, develops in two days. The fever is from 38.5 to 39.5° C.; the animals are slightly dejected; the appetite is a little affected and from time to time there is coughing. In spite of this favorable evolution this rudimentary form may have as its consequence the production of laryngeal hemiplegia and of tendinous synovitis, which proves that this form is determined by the same infectious agent. This is of great importance when determining the origin of the laryngeal hemiplegia.

2. Cases where the affection is benign and accompanied by marked disorders of the digestive tract and the cutaneous functions belong to a second group.

(a) Just as in human gripe, in the horse there may predominate at first some gastroenteric symptoms, such as loss of appetite and diarrhea. These are not rare. Colic is observed, moreover, with ejection of the dung. Several times I found the anus gaping on the third or fourth day. This rectal paralysis in all cases persisted only one or two days. It is then impossible to take the rectal temperature.

(b) As in human gripe, some cutaneous symptoms may be present. In addition to local sweating, I have ascertained some small cutaneous tumefactions where later desquamation and depilation are observed, due to the previous production of exanthema. In the case of two sick animals I noticed an extensive eczema on the head and legs. In literature there are reports of cases where the mane and hair of the tail fell out.

In this respect, also, there is an analogy with what is observed in human gripe, a sudoral hypersecretion and cutaneous lesions, which in some cases are assembled under the form of spots analogous to those of measles. In other cases these lesions form scarlatina-like plaques. The falling of the hair is also produced in the horse in mild cases as well as in severe; new hairs are already formed beneath those which have died. Even if the hair continues to live, the hair bulbs are manifest during the febrile period. They are observed especially on the hairs

of the tail where the spinal cord is interrupted for a space of about 5 mm. The hair is finer there and provided with a stricture. At the same time there is observed an affection of the horny production of the foot, clearly manifested later under the form of depressions (rings). These two changes are the consequences of nutritional disturbances. The falling of the hair, the change in its growth and the rings of the hoof are produced then in the same way as in human grippe.

In a third group of cases I place those which, although they terminate favorably, present a more severe symptomatic picture, and notably—

3. Cases where the entire symptomatic picture is pronounced. The animals give the impression of being severely affected. The head droops; it appears too heavy to be raised. The eyelids are closed. The sick refuse all nourishment, remain motionless and do not lie down. On the fourth day of the febrile period, an improvement is noticed simultaneously with the fall in temperature.

In certain cases symptoms of one organic group are more pronounced and last longer than normally. Then severe manifestations, cardiac or pulmonary, predominate, alone or associated. These manifestations are the consequences of disturbances of innervation, coming from the action of the microbial factor.

The cerebral affection asserts itself through motor, psychic and sensory disturbances. The position of the animals is uncertain; they do not dare to change their position, and they support themselves whenever they can. If they do not find this support, they take strange positions, knees drawn close under the body, the rump greatly huddled up. Usually they do not lie down at all; if they finally do lie down the act is quite brutal. Generally they get up quickly; they give the impression of being afraid of being unable to stand up. The change in the motor centers also plays a part in the weakness of the back and of the muscles, which I think is incorrectly named. It is not a question of motor weakness; the weakness is the result of incoordination. Because of imperfect innervation, there is a break in the harmonious functioning of the different muscular groups, from which result the disunited and uncertain movements. The animal stumbles, a condition shown much better when it is blinded.

The comatose condition is not so pronounced as one might think at first sight. If one approaches the subject, or if he wishes to push the animal over a little to make an injection, the aspect changes immediately; the coma is replaced by a convulsive state; the animal looks about anxiously. The quick closing of a door or window, or the entrance of a dog into the stable may provoke this excitement. During this period, I frequently noticed some hyperhidrosis. This overexcitation is generally followed by an extraordinary depression. The articulations are mournful; the weight of the body is usually carried on one leg or the other. The intercostal pressure indicates pleural sensibility, in spite of the fact that the lungs are absolutely normal.

As other symptoms of a special group of organs, cardiac changes may be noticed in benign cases. The heart beats are even and the pulsations jerky. These symptoms are always only temporary and their disappearance coincides with a great amelioration of the general condition.

I add to the same group of benign cases those with pronounced changes in the respiratory tracts. These may be limited to the anterior as well as to the deep tracts. Among the first are the mild catarrhs of the nose or of the nasal pharynx; among the second, notably the temporary congestive state of the lungs. These last varieties of the normal course of the affection, which gave me a general view of the disease, were determined by means of a diagram of the semi-daily recording of the pulse, temperature and respiration. Several times cases were determined where the lungs were affected. At the beginning of my clinical study I was embarrassed by such observations until after I had proved that sometimes twelve to twenty-four hours later nothing could be seen of the pulmonary affection present at the beginning, and that in place of an aggravation, there was an important amelioration of the general state. Autopsy of the animals in which such a pulmonary hyperemia was observed showed that the congested state might be limited and that in general no more germs were found there. It will result from what follows that this change must be due to the action of the toxins on the pulmonary vasomotors.

Changes in the intestinal tract.—Among the important changes in the intestinal tract must be observed the acute hemorrhagic inflammations, which may extend throughout the entire intestinal

tract or be limited to a part of the large intestine. In the first case the excretions are of a reddish color, dark or black, and severe colic is observed. The cecum may be secondarily involved.

Changes in the nervous system.—These exist in human gripe as well as in that of the horse. However polymorphous the symptomatic picture is, the nervous changes are found characteristically in the foreground. The picture of the disease is not complete if the nervous symptoms are lacking.

The different changes may be classified in two groups. In the first may be placed those cases in which mucous lesions of the respiratory tract are found in addition to the nervous symptoms. In the second group are the majority of cases, where the nervous symptoms exist exclusively without any sign of a primary local disease.

The nervous lesions are of a cerebral nature as well as peripheral, and their intensity varies with the degree of irritation provoked by the microbial factor, which may be moderate or severe. These changes are observed prevalently and more intensely in subjects of Irish blood, who have more sensitive nervous systems than those of the native, more lymphatic race.

These nervous lesions may be limited (a) to the cerebrum and meninges; (b) to the medulla oblongata; (c) to the spinal cord; (d) to the peripheral nerves.

(a) *Cerebrum and meninges.*—When the irritation is moderate, the nervous symptoms are restricted to certain depressive changes and to disturbances in coordination. If it is more severe the nervous changes are also more severe.

(b) *Medulla oblongata.*—The nervous symptoms indicating a change in the centers of the medulla oblongata deserve special attention. It is very interesting to see a horse which appears to be quietly eating hay, but without ever swallowing. The partly chewed feed remains between the teeth and the cheek or falls from the mouth. On more careful observation it is found that the lips are weakened, especially the lower lip, which droops (facial diplegia). In order to drink the mouth must be plunged into the water to above the labial commissures.

The taking of liquids and solids is then difficult. When the eating of solids is impossible, the tongue hangs out of the mouth (hypoglossal nerve involvement). When these sick animals take green feed, regurgitation through the nose occurs. The dis-

turbances in alimentation, mastication and swallowing are the consequences of a partial paralysis of the muscles innervated by the facial, hypoglossal and glossopharyngeal nerves. The lesion of the facial nerve is central; the zygomatico-temporal nerve is affected; the ears and the upper eyelids droop. The nostrils are contracted, yet they allow enough air to pass.

The vagus nerve as well as the second branch (the recurrent nerve) are affected. As a consequence of their irritation, there is produced a laryngeal stricture (laryngeal diplegia), which may also be the cause of an inspiratory dyspnea and disturbances of phonation. If the animal is descended from parents of which the stallion or mare presented a laryngeal hemiplegia, and if there exists therefore a hereditary predisposition for this disease, the disease remains chronic even if the form of the grippe was very rudimentary.

(c) *The spinal cord; medullary meninges.* (d) *Peripheral nerves.*—Rectal paralysis has also been observed in the course of contagious pleuropneumonia and always in the mare, very often associated with a caudal paralysis, sometimes with a paralysis of the bladder and of the hind quarters. The lower and posterior hemorrhoidal nerves give off motor ramifications to the tail and rectum, coming from the fourth or fifth vertebral pairs, as has already been mentioned. I was able to find cases of anal paralysis when the malady exhibited a normal course, and this was usually found after the crisis (fall of temperature). This paralysis did not extend to the rectum; the defecations were still performed, but slowly.

This causes me to admit that paralysis of the sphincter is of central origin. It is the same for the weakness of the back (posterior muscular paresis). At different times I perceived a habitual patellar dislocation (unilateral and bilateral) analogous to the vertical dislocation of the patella of man. The crural nerve innervates the quadriceps femoris muscle. Energetic contractions of this muscle may determine the patellar dislocation; it is unanimously admitted that this dislocation is the result of a severe weakening. It is true that this is presented by the animals which are evidently severely affected by the grippe, but one must not exclude its central origin. At autopsy, infiltrations and hemorrhages are observed in the meninges of the spinal cord. All these symptoms disappear except the laryngeal hemiplegia, which persists to the chronic stage with certain predisposed animals.

I was also inclined to attribute to the affection a permanent change in the movement of one or both hind legs, called "cock's gait," which appears in the Irish animals especially. This "cock's gait," according to my opinion, is the consequence of a change in the normal innervation. The movement is reflex. This chronic motor change is comparable to the minor chorea of man, which is also exhibited in the course of grippe. I believe that this disease should be considered as a change in co-ordination, as ataxia.

From the description of the neural disturbances which may be observed in acute cases of equine grippe, they may be classified under three forms—medullary, spinal, and peripheral. They are principally the consequence of the action of toxins of the microbial agent on the motor nerves.

Disturbances of the circulatory organs. (a) Heart.—The manifestations which the circulatory organs exhibit in their function are also the result of disturbances of innervation. They may greatly predominate, or even exist alone, without any change in the respiratory organs. In each case of the disease symptoms are found indicating that the vagus and sympathetic nerves are involved in the pathologic process. The intensity of the symptoms is in direct proportion to the irritation. If it is mild, the cardiac beats are accelerated; a more intense irritation provokes their abatement. A severe infection with a high, persisting fever exhibits as a result an intense degeneration of the cardiac muscle. The cardiac symptoms are then pronounced; the pulse is very frequent and weak; heart beats are bounding; cyanosis of the nasal, lingual and buccal mucous membranes is observed and life is directly menaced (angina of the chest and collapse). When cardiac lesions exist, the pathological symptoms are more rapid and more pronounced and the termination of the disease is frequently fatal. In these cases I made the following observations: In a subject in which the progress of the disease was natural up to the fourth day of the infection, the pulse and the heart beats did not give any occasion for therapeutic intervention. The sick animal had a good appearance and took the feed that I offered him. The horse gave the impression that the thermic reaction would be produced quickly. A half hour later I was informed that the animal had been found dead in the stable. I thought this sudden death could be attributed to cardiac paralysis. At autopsy I

found a cardiac hypertrophy and myocarditis; the lungs appeared entirely normal. As a complication of grippe of the horse, found also in man, an endocarditis and pericarditis may be produced.

(b) *Vascular system*.—Among the most interesting neural symptoms are manifestations on the part of the vascular system. Their production is also the consequence of the disturbance of innervation caused by the direct action of microbial toxic products on the vasomotor center, as well as on the center of the vascular nerves in the medulla oblongata. The results are various and are found here also in relation to the nature of the irritation. The numerous indications prove that an irritation of the vasomotor nerves is produced. If this is prolonged or becomes more intense, vasomotor paralysis results. In consequence of the irritation of the vasomotor center, all the arteries contract at the beginning of the affection, from which there results an increase of blood pressure and the dilatation of the heart as well as of the veins. At the time of the paralysis of the nervous center, we see the opposite condition produced. It is this which explains the variations in the rise of the pulse and the heart beats, becoming established in the course of the affection.

If, after an intense irritation, a consecutive paralysis of the vasomotors is produced, the pulse becomes weak and slackened and the heart beats slight and slow. The vasomotor paralysis may also be local, limited to a special nerve innervating a radius or fixed organs, as, for example, the intestine, the lungs, kidneys, pleura, etc. An arterial congestion of this radius or of this organ follows immediately, from which results the production of the bloody injection (hyperemia) with the rise in temperature and an increase in the capillary transudation. These vessels become dilated and the circulation of the blood is impaired.

Thus is explained the accumulation of a transudate in the pericardium, thorax, joints, bursæ, synovial sheaths, etc. (transudative pericarditis, pleurisy, arthritis, etc.).

What is especially characteristic in this disease is the tendency to hemorrhage (cerebral, ocular, auricular, cutaneous, nasal, pulmonary, intrathoracic, gastric, intestinal, renal vesical and uterine hemorrhages). They too are the consequences of angioneurotic disturbances. There may also occur in the course of the affection epistaxis, hemorrhagic pleurisy, enteritis, neph-

ritis (hematuria, hemoglobinuria), abortion. This process is derived especially from the venous center. I explain the foundering of the horse in this way.

In the skin may be produced in the course of influenza (in man more perceptible than in the horse) different forms of paralytic phenomena of the vasomotor nerves, exanthema, which are manifested in certain cases in isolated plaques (like measles); in others in confluent plaques (like scarlatina). If the transudation is increased in the cutaneous vessels, vesicles are formed; moreover, an extravasation of red blood cells may occur, and thus edema, hemorrhage and even eczema may arise.

As a consequence of the sanguineous transudation of polyuria and hyperhidrosis, there may be noticed a diminution in the weight of the body, a condition which may be important in a short time.

Like vasomotor disturbances, it is necessary to attribute trophic disturbances also, such as the abnormal horny growth (hoofs), the desquamation and falling out of the hair (of the mane as well as of the tail), to the change in the sympathetic nerve due to the toxins of grippe. The abatement and the obstruction of the circulation of the blood cause the dilatation of the cutaneous capillaries; the blood there becomes largely venous, from which results the bluish discoloration of the skin.

Changes of the respiratory tract.—If the respiratory organs are involved it is the direct result of the action of the microbial agent upon the respiratory center and the nerves innervating the heart and lungs. The action is identical in the gastro-enteric form. All symptoms produced in the course of the affection are of primary neuropathic origin.

We have observed some severe cases without lesions of the anterior and deep respiratory tracts. In man, as well as in the horse, it has been possible to prove at different times that the existing pulmonary changes were not the cause of death.

Clinically, the coughing and respiratory acceleration give the impression that the respiratory tracts are involved. The respiratory changes may even be striking and cause one to think that the animal is suffering with a severe pneumonia. From the negative result of the thoracic examination it is evident that the changes in the respiratory organs must be due to disturbances of innervation. They are the consequence of the toxic action of the microbial factor, as much on the respiratory center, which

is found in the medulla between the pneumogastric nucleus and the accessory, as on the sympathetic nerve and the pneumogastric nerve which innervate the respiratory tracts.

The irritation results in frequent respiration; an intense, persisting irritation provokes a diminution of the number of respirations and even finally the arrest of the respiratory apparatus.

The pneumogastric nerve is very complex, which explains the polymorphism of the change in different parts of the respiratory tract. Inflammations of the nose, larynx, pharynx, trachea, bronchus, bronchiole and the pulmonary tissue may exist, alone or associated.

However favorable the evolution of the affection may be, it will always be found that the pneumogastric nerve is irritated by the microbial agent. Concerning this subject I refer to pathologic cases where a laryngeal hemiplegia persisted in spite of the disguised progress of the affection. Notwithstanding the fact that no sign of an inflammation of the mucosa of the larynx existed, such an inflammation was manifested by the cough. So this is also reflex, in consequence of the irritation of the center of coughing and of the sensitive ramifications innervating the larynx. In the horse there may still be manifested some edema of the glottis (dyspnea and rales). This condition may present itself in a few moments.

In many cases it may be asserted as if proved that the evolution of human influenza and contagious pneumonia of the horse takes place without any catarrhal change in the respiratory mucous membranes. In other cases there are found symptoms establishing the fact that this mucous membrane is involved; then the catarrhal symptoms are predominant. Their intensity is variable, according to whether the inflammation is superficial or deep, whether it is confined locally to the anterior tracts or extends as far as the deep tracts.

When the trachea or bronchi are affected there is great liability that the bronchioles and the lung tissue will also be involved. It may also come about that, although there is no marked affection of the respiratory mucosa, sudden pulmonary complications are produced.

We know that an intense irritation provokes vasomotor paralysis. If this is produced in the vasomotors of the pulmonary vessels, there results an immediate arterial congestion in the

regions innervated by the nerve ramifications (pulmonary congestion). From this vascular dilatation is derived a more profuse capillary transudation and the rise of serous products. Pulmonary edema will then be displayed at this place. The disturbances of respiration are then marked and the animal gives the appearance of being attacked with a severe pneumonia.

If there are complications in other organs death may occur. At autopsy one is then astonished to find a pulmonary lesion of small dimensions (often only the size of a tennis ball) in which the presence of germs can not be detected. This has also been proved by Koch and Gaffky in the horse. If the temperature does not fall after it has remained high for three days, if the fever remains constant with an association of respiratory disturbances, one may be assured that the pulmonary congestion exists as a complication.

It is to this period of the disease that one's entire attention must be given; if not, then the congestive state of the lungs may be the determining cause of death.

I consider the fourth day after the fever has reached its maximum as one of the most critical periods in the course of the disease of the horse. Two eventualities are then possible:

1. The congestive pulmonary state is maintained more or less for two days, after which there occurs a sudden fall in the temperature. Just as in the beginning of the disease the temperature reached its maximum in two bounds and in two days at the most, now we see it fall in two drops. At the same time and just as rapidly an amelioration of the disease occurs. The pulmonary congestion has been of short duration; the organ has overcome the microbial agent. The reaction does not progress with an increase of expectoration.

2. When the overexcitement persists, especially that of the nerves innervating the respiratory tract, the angio-neurotic symptoms of the lungs are pronounced. The lungs become congested because of the respiratory disturbances and from this there results a more profuse capillary transudation and finally the penetration of blood into the lung tissue. In this respect the striking conformity with what occurs in man can not be denied.

Now, according to my opinion there are two ways of explaining the presence of bacteria in the focus of the pulmonary inflammation:

1. Motor and sensory laryngeal disturbances (paralysis of the recurrent nerve with all its consequences) are caused by a hyperirritation of the motor and sensory nerves of the larynx. This paralysis gives occasion for the bacteria to penetrate into the lung.

2. The pulmonary focus of inflammation (hyperemia) is to be considered as a classical example of *locus minoris resistentiæ*, where there will accumulate the diplo-pneumococci which have penetrated into the circulatory system in the meantime.

According to my opinion the pulmonary infection is caused sporadically, bronchogenically but most frequently hematogenically.

In this way can be explained the production of other purulent inflammations which present themselves as complications of contagious pleuropneumonia and of human gripe. Among other observations I have found an empyema, which in one case extended to a fatal termination while the lungs were absolutely normal.

Having reached the focus of congestion, the bacteria multiply and provoke further inflammations, such as sanguineous necroses and abscesses. The presence of diplo-streptococci in the spleen proves that they penetrate into the circulatory system.

In respect to pulmonary complications in the horse, Prof. Gaffky proves the following microscopically:

The point of departure of the local modifications is determined by divisions of the finest respiratory ducts in which, at the beginning of the disease, there is produced a vitreous exudate, translucent, slightly gelatinous and yellowish, and in the periphery of which there is a large cellular accumulation and some serous infiltration. In the radius of the affected bronchial branch the pulmonary vesicles are filled with a richly cellular fluid. At places where the pathologic foci approach the pleura there also occurs an infiltration of the subpleural tissue with a translucid, yellowish, gelatinous fluid. The cellular tissue between the pulmonary lobules affected at the beginning of the disease is infiltrated with serum.

The occurrence of pneumonia in the course of the disease also depends directly upon the virulence and the action of the microbial agent on the nerves and the respiratory tract.

As far as the character, progress and mortality of grippal pneumonia of the horse are concerned, they accord remarkably with the pulmonary complications of human gripe. The same analogy is observed for the anatomopathological pulmonary and pleural lesions.

This analogy is not limited to a secondary pneumonia only; it extends even to the complications arising at the same time as the pulmonary lesions which may occur in the horse.

The primitive, erroneous name for the affection, "contagious pleuropneumonia of the horse," indicates that the pleura is simultaneously affected.

A dry, transudative, serofibrinous, exudative, hemorrhagic, purulent (empyema) pleurisy may exist, associated with the pneumonia or separately. The pleural vessels are then greatly injected.

The existence of a necrosed pulmonary focus in the pleural cavity is followed by empyema. There may also be produced a connection with a bronchus (pneumothorax). Pulmonary abscesses, pulmonary gangrene, pyemia and septicemia may also be observed.

The following diseases may persist in the horse as secondary affections of the pulmonary change: Heaves, as a consequence of the pulmonary emphysema; atelectasis of the lung tissue, cavities or the union of the pleura.

As further complications there may be found in the horse pericarditis, parenchymatous myocarditis, ulcerous endocarditis, acute leptomeningitis, parenchymatous nephritis (hematuria and hemoglobinemia), anasarca, arthritis, phlebitis (thrombosis), tendinous synovitis, icterus, exudative and hemorrhagic iritis, founder, abortion, etc.

When the affection of the horse proceeds normally and without complications, abortion is observed seldom or not at all. In severe cases, on the contrary, especially when the lungs are involved, the danger of abortion is great. Thus in this respect also there is an analogy to human influenza. It is not even necessary for hemorrhages of the fetal investing membrane to occur in order to produce abortion. The vascular disturbances from which stasis (accumulation of carbonic acid) or transudations result may cause the detachment of the embryo, without it being a question of inflammation. If hemorrhages of the chorion are observed, they are not necessarily of inflammatory origin. Blood is not extravasated by rupture or inflammation; it passes through the vessel walls which have become permeable.

Now, comparing the symptoms observed at the time of the influenza of 1918-1920 and described and published in the periodicals of this and foreign countries, as well as the symptoms

observed during the epidemic of 1889-1891 in Holland and Germany as well as France, I have established by clinical observations what I am about to describe:

1. That symptomatically the so-called "contagious pleuropneumonia of the horse," whether normal, rudimentary or complicated, is absolutely identical with human influenza;

2. That the expressions "contagious pneumonia," "contagious pleuropneumonia," "Brustseuche," etc., are absolutely incorrect and should be replaced by that of "equine grippe."

I admit that it was difficult for the practicing veterinarians to obtain an exact idea of the disease under ordinary conditions and without taking any special measures. This is due to the numerous accessory conditions which enter into consideration.

In the beginning I, too, had the temperature recorded only after a horse became less animated, when it coughed from time to time, or when it showed a loss of appetite, and I treated the patient in the stable in which it was taken ill. Soon I found that even the most minute inspection, permitting a detection of the least psychical disturbance of the horse, was insufficient to detect the affection at its beginning. As the very early discovery of an infected horse is of capital importance for the evolution of the disease, it is then indispensable—

1. That the temperatures of all the animals be recorded regularly, morning and night.

2. That the detention and treatment of the sick be carried on in a stable which is fresh, spacious, free from dust, quiet, and with good ventilation. As far as possible, fresh air should be introduced in a permanent way, without occasioning drafts of air. A necessary condition is that each patient have plenty of room so that he will not be bothered by his neighbors.

It is in such a stable that I was able to observe successively more than 500 subjects affected with contagious pleuropneumonia. As far as possible all accessory influences were removed here, and I was able to obtain a view of the polymorphous picture of the disease. The great importance which should be attached to the quick discovery of the patients, to their isolation, to amelioration of attention and to regular control certainly needs no further emphasis.

If identical measures are taken in individual stables in which there are a large number of horses, the clinical picture of the disease will also be presented there as in usual cases, and other

competent persons will be able to establish the exactness of the description which I have made of this disease.

Veterinary Captains Lameris and Van Syverden, who have been connected with the remount depot for several years and may consequently be considered as competent, declare that they are in accord with me in what concerns the clinical picture of contagious pleuropneumonia. Recently attention has been directed abroad to the identity of human grippe and this disease of the horse.

Orticoni, Barbier and Auge (2)¹ arrived at the conviction that a close relationship exists between the causal factor of severe forms of epidemic influenza and the animal "pasteurelloses," among which contagious pleuropneumonia is abusively classified in France.

In America attention has been directed by G. A. Soper (3) to influenza of the horse, the complex symptomatology of which, in his opinion, presents a great analogy to human influenza.

In Germany Hirschbruch (4) calls attention to the identity of grippal pneumonia with "Brustseuche." Although this is exact, nevertheless it is observed that the author makes the mistake of including the secondary pneumonia in the symptomatic complex, in human grippe as well as in the disease of the horse.

In Switzerland H. Swicky (5) indicated the analogy of an infectious disease of the respiratory organs of the mule with human influenza.

Lieutenant Colonel Knipscheer, who has served several years at the remount depot at Milligan and who has published several communications on the so-called contagious pleuropneumonia, indorses my opinion that symptomatically the identity of that disease with human influenza is incontestable.

Considered in the light of this clinical identity, bacterial and experimental investigations, instituted on a high scale for several years, relative to the transmission of the equine disease, receive a special importance from the point of view of human influenza. This is all the more noteworthy since the most eminent bacteriologists, such as Gaffky and Robert Koch, have concerned themselves with this question.

¹ Numerals in parentheses following authors' names refer to list of literature at end of paper.

THE NECESSITY OF LIVESTOCK SANITARY REGULATIONS IN THE CONTROL AND ERADICATION OF BOVINE TUBERCULOSIS ¹

By M. JACOB, Knoxville, Tennessee

IT SHOULD BE APPARENT to all that a constructive regulatory service can be regarded as such only when based upon corresponding laws, rules and regulations. The term constructive is used because it has far-reaching significance in our efforts to administer an efficient public service toward the results which we ultimately hope to attain. If your experience is similar to mine, you have frequently been forced to ask yourself the question whether or not the regulations under which you are operating permit the handling of your problems in a manner giving justice to all concerned. While our function is primarily that of controlling and eradicating transmissible livestock diseases, we must nevertheless give due consideration to the various agencies which become affected either directly or indirectly through the activities of our department; and while we can not hope to overcome all the ruffles in every instance, much greater progress will be made if we have assured ourselves that we are operating on sound basic principles. Such methods encourage more general public cooperation, without which our task becomes exceedingly difficult.

A comparative review of livestock sanitary control work as conducted in the various countries throughout the world easily places the United States in the front rank, and this can be attributed to the very fact that the guiding spirits of our system have been men of forethought and vision, coupled with the ability of practical application. I refer here especially to our Federal Bureau of Animal Industry. Accomplishments along this line by many of our State departments also entitle them to similar recognition.

Regarding the State and Federal departments, it may be stated that there is marked evidence of a relationship which is becoming closer from time to time; and as so much of livestock sanitary control work is cooperative, and each department work-

¹ Presented at the Tuberculosis Conference of the Southeastern States, Atlanta, Ga., 1921.

ing for a similar purpose, this is as it should be: This has resulted in a unification, to a considerable extent at least, of many of our regulations. I know of no good reason why it should not be the aim of every State to correlate her regulations so as to conform as nearly as possible to those of the Federal department, and if the laws of the State do not permit this, they should be amended at the earliest possible moment.

We have had no better example of advantage in uniformity of regulations than in what has been accomplished in the added efficiency in the inspection of cattle for interstate shipment. I fully realize that this is not by any means 100 per cent perfect at the present time, yet we can not deny the fact that the adoption of Regulation 7 has brought about a service more dependable not only to livestock interests, but to the veterinary profession as well. What has been accomplished toward greater efficiency in the interstate movement of cattle from a health standpoint can also be done with horses, sheep and swine, and I believe the time has come when we are ready for such similar extension of Federal supervision and cooperation, not overlooking the fact, of course, that local conditions must always be taken into consideration. It may seem that I am getting away from my subject, but this is only for the purpose of adding stress to the importance of more uniformity in our livestock sanitary relations.

Coming now to the subject proper, that of bovine tuberculosis, I believe it to be one of the most important questions confronting the livestock interests of the South at this particular time. I make this statement not to leave an impression of the extreme prevalence of this disease, but exactly the opposite, as indicated by the comparative reports issued at regular intervals by the Bureau of Animal Industry. But the very fact that the percentage of reactors is so small in our Southeastern States makes it impossible ever again to handle the problem as economically as at the present time. I firmly believe that the States which now comprise the Southeast, through the extension of our cooperative eradication work, supplemented with rigid enforcement of judicious regulations, can be made free from tuberculosis in a relatively short period of time. When I refer to an area as being free, I have in mind not over 0.5 of 1 per cent reactors, with a correspondingly low percentage of open lesions. The

history of the prevalence and spread of tuberculosis in the South reveals some interesting facts, and while my observations have been limited largely to my own State, I dare say conditions are very similar in the others. But the thing which has impressed me is that an earlier existence of certain control regulations which are now in force should and would have prevented many of the centers of infection which we have found within the past few years.

In 1909 I drafted a bill and, with the aid of the State Dairy-men's Association, had it passed through the legislature, requiring the tuberculin testing of all cattle brought into the State to be used for dairy or breeding purposes. The thing which impressed the importance of such a law was the discovery of a large shipment of purebred cattle into Tennessee, the physical appearance of which urged me to suggest the tuberculin test, and to the amazement of both the owner and myself, 90 out of 100 head reacted. When this case was cited to the members of our legislature it was not a difficult matter to produce a convicting impression as to the importance of such a livestock sanitary regulation. But, unfortunately, many importations had been made previous to that time with their varying degrees of infection. While a certificate of health recording a properly applied tuberculin test covering the shipment has given us a vast amount of protection against the introduction of tuberculous cattle, we are not by any means justified in relying on it as our sole dependence—a statement based on field observations. Consequently in March, 1918, we promulgated Official Order No. 42, requiring the tuberculin retesting of cattle shipped for dairy and breeding purposes within 90 days following their arrival in the State. Subsequent events have substantiated the wisdom of the adoption of such a regulation. It is one which should be uniformly adopted and enforced by our Southeastern States.

Furthermore, I am about convinced that all such retests should be applied by the combination method. In this connection I am compelled to make some additional reference to Regulation 7, which, as previously stated, has strengthened the efficiency of inspection for interstate shipment very materially. Yet the provision whereby it was possible to ship female cattle and bulls from public stockyards under the *nom de plume* of feeders and

grazers was found not to be wholly satisfactory, as it opened a dangerous gap; consequently the State assumed its prerogative by requiring the tuberculin test on bulls and females included in such shipments. The compliance with our ruling in this matter has already revealed several reactors at point of origin, which, under the original acceptance of Regulation 7, would have reached our State. Of course it might be argued that these cattle would have been held under official quarantine during the feeding or grazing period, but there is where the difficulty lies. Strict quarantine without immediate supervision is practically impossible with this character of shipments.

Under Regulation 7 it is also possible to ship cattle interstate to public stockyards where Federal inspection is maintained without restriction, and in order to minimize the possibility of distributing the infection from such shipments we issued our Official Order No. 57, which requires that before any cattle intended for dairy and breeding purposes can be moved intrastate out of public stockyards they must pass an official tuberculin test, provided such shipments of cattle have originated in other States. This again is in line with my original thought in that we must use every reasonable means toward preventing the introduction of tuberculosis from other States and probably more highly infected centers.

We can not lay too much stress upon the importance of vigilant supervision covering movements of cattle from those States which I reluctantly refer to as hotbeds of tuberculosis, for whenever we successfully control our importations we will have solved the greatest menace to the cattle industry of the South so far as control work on this disease is concerned. In other words, we should cease to be the victims of States like Illinois, Iowa, New York, and probably a great many others, where tuberculosis has become such a serious problem.

Several of our regulations toward the control of this disease have been adopted since the inauguration of State and Federal cooperative work and have been the means of giving material strength to the system as a whole. One especially which I feel is far-reaching in its effect is our requirement that all cattle 6 months old and over exhibited or maintained on the grounds of our larger fairs must show freedom from tuberculosis by the application of a recognized tuberculin test applied since Janu-

ary 1 of the year during which the fair is held. This regulation, I am pleased to state, has the utmost respect of our breeders of purebred cattle. The first year this regulation was put into effect one herd of cattle from another State reached our State Fair without a tuberculin test certificate. They were immediately tested by our department, with the result that two cows reacted, and they showed well-marked lesions on post-mortem. These same cattle had been exhibited at several preceding State fairs, including Kentucky, Ohio and Indiana. It should not require more than a single occurrence of this kind to impress the necessity of beginning with the enforcement of regulations governing the public exhibition of cattle.

This also brings to mind the restrictions which should surround public sales of purebred cattle. I am quite sure that the activities of certain purebred cattle sale promoters have been somewhat interfered with in our State by the enforcement of the 90-day retest regulation, which I believe has been a distinct benefit in two ways. First, it has kept out some undesirable cattle, and again has given greater protection against tuberculosis. However, my main point here is that all dairy and breeding cattle, whether of intrastate origin or otherwise, sold at public sales, should be sold on a recognized tuberculin test and subject to a 90-day retest, this in preference to a 60-day retest.

We have enjoyed the cooperation of our breeders and breeders' associations in this matter to a most satisfactory extent, with the result that practically all public sales of this kind within the past two or three years have been made up of cattle from herds under supervision. The East Tennessee Jersey Cattle Breeders' Association has included in its constitution a provision that in order to be eligible to membership the applicant must be maintaining his herd under State and Federal supervision. Regulations governing public sales should very soon encourage many breeders and breed associations to adopt a similar policy. When once a breeder or an association gets into this work, they are not slow to realize the advantage to be derived therefrom.

Many of our regulations now in force and the suggestions offered are centered to a considerable extent around purebred cattle, which is in accord with the existence of actual conditions. I have always contended that whenever tuberculosis has been

completely eradicated from our purebred herds Tennessee will be practically free from this disease. Importations for herd foundation or improvement is of course responsible for its greater prevalence among such herds.

So far I have dwelt on this subject principally in a manner involving interstate movement, but there are intrastate problems which must also be safeguarded and handled under proper regulations. Willing cooperation, as already stated, especially on the part of the owner, should be encouraged, if we hope to make maximum progress in eradication. While fair indemnity for reacting cattle is not the all-important point, nevertheless it gives an impetus, the results of which can not be obtained in any other way. I think every State should make it possible to reimburse the owner to some extent. While this does not necessarily influence the attitude of some, it means a great deal to others, especially the small breeder or the average owner of a milk cow. Furthermore, the gradual increase of Federal appropriations for indemnification purposes should be shared by the various States, the regulations of which should be adjusted accordingly.

Regulations governing the inspection of dairy and meat supplies, whether Federal, State or municipal, has also become a great factor toward what we may be able to accomplish in this work and should be encouraged in every way possible. The tuberculin testing of dairy herds in compliance with municipal regulations falls in most instances to the lot of the private practitioners. There are innumerable instances where some of our best practitioners have shunned such work on account of its interference with their regular routine of practice, consequently much of this work which otherwise would have been carried out or encouraged has been left undone. The more general recognition of the intradermic method of applying the test will, I believe, overcome this obstacle to a considerable extent, and with that in mind we have modified our regulations so as to recognize this test for dairy inspection work, which has already shown a decided increase in the number of dairy cattle tested, with post-mortems revealing just as much accuracy as by the subcutaneous method.

Postmortem reports from slaughtering establishments where inspection is maintained, covering lesions found, have also been

of great assistance in locating centers of infection. It would be well to require such reports to be made through special regulations. It is true that this is being done where Federal inspection is maintained, but it is not carried out as a rule where the supervision is municipal.

The disposal of reacting cattle is a question which is also entitled to most serious consideration in a discussion of this kind. Regulations regarding this matter should be specific and so worded that their meaning can not be misconstrued. Fortunately most States are now handling this phase of the work with greater efficiency, but there is no doubt that in years gone by many diseased cattle were lost sight of either with or without special design. Every State should know the ultimate disposal of every reactor within its borders. If the regulations in force do not make this possible they are lacking in the most vital point. The diseased animal is the spreader, and we can never hope to control and eradicate disease unless its movements can be restricted. Personally I am a firm believer in the slaughtering of reactors at the earliest possible moment, but there are conditions under which, in justice to all concerned, we provide for the holding of the animal in strict quarantine for varying periods of time. As to whether or not this is advisable should be left to the discretion of the official in charge of the State regulatory service, and he should act only after carefully weighing every side of the question, not failing to take into consideration the responsibility of the owner and the character of his premises. There are comparatively few breeders who are fitted, temperamentally or otherwise, to maintain cattle under the Bang system, but there are conditions under which we are justified in permitting this to be done, and, as already indicated, we must be sure that no one, even the owner himself, is suffering an injustice thereby.

In attempting to meet the requirements of my subject I have tried to impress the real necessity of sanitary regulations in the gigantic task of controlling and eradicating this insidious disease. But there is another side, as to the manner by which these regulations help to accomplish our purpose and which I think is frequently overlooked, namely, the educational effect. Constructive regulations have a wholesome influence on those whose interests are involved and will cultivate a desire to ob-

tain more information. It has been my observation that whenever a person becomes sufficiently interested to inform himself on matters of this kind he ultimately becomes a cooperating factor.

The question of tuberculosis is having a most decided influence in the production of breeding and dairy cattle from a commercial standpoint. Those herds, communities or States which are able to offer the greatest protection against tuberculosis are beginning to attract the prospective buyer, assuming, of course, that the quality of the cattle is of equal merit. The situation as I am able to view it offers an opportunity for the Southeastern States.

SETTLING WITH THE OWNER

An auto dashed along a Texas country road and, rounding a curve, came suddenly upon a man with a gun on his shoulder and a weak, sick-looking dog beside him. The dog was directly in the path of the machine. The chauffeur sounded his horn, but the dog did not move until he was struck. After that, he didn't move either.

The car stopped, and one of the occupants got out and went back. He had once paid a farmer ten dollars for killing a calf that belonged to another farmer, and this time he was wary.

"Was that your dog?" he inquired.

"Yes."

"Looks as if we had killed him."

"Certainly looks so."

"Very valuable dog?"

"Well, not so very."

"Will five dollars satisfy you?"

"Yes."

"Well, then, here you are." He handed the man a five-dollar bill, and added, "I'm sorry to have broken up your hunt."

"I wasn't goin' hunting," replied the owner of the dog.

"Not going hunting? Then what were you doing with the dog and the gun?"

"Goin' down to the woods yonder to shoot the dog."—*Everybody's Magazine*.

ADDRESS OF THE PRESIDENT OF THE NEW YORK STATE VETERINARY MEDICAL SOCIETY¹

By D. H. UDALL

Ithaca, N. Y.

THIS is the thirty-second annual meeting of our society. For nearly one-third of a century, men—some of whom perhaps are here today—have met to advance the interests of the profession and the general welfare. Each decade has brought its own particular progress and decline, but at the close of each, one has been able to look back upon achievements that surpassed the most hopeful expectations.

As an association we are interested in principles that affect the profession as a whole, rather than the fortunes of any one group. We are concerned with those influences that advance the value and importance of our service.

Perhaps the chief influence for progress in the past thirty years has been a constant growth of education, an improvement in the development of the intellectual power possessed by those who sought learning in veterinary science. This has come through changes in an educational system that fitted pioneer conditions, and that covered a notable period in the history of our profession in America, made so by the names of a few whose influence and wisdom are permanent. But the closing days of this system, like those of many another period, brought a legacy of a different character. No learned profession has in recent times been so much of an educational outcast as ours. Since the evil is now corrected, nothing is to be gained by a recital of details. But we continue to suffer from its effects in the form of a low public estimate of the veterinarian. One has only to recall occasional specimens of our late army to appreciate the intellectual and personal inferiority that has encumbered the profession. Their origin is a mystery. No one here may take offense, for their haunts do not include gatherings of this kind, but they do yet, in too many communities, carry the burned-out torch of a dead generation. This estimate of the veterinarian chiefly applies to those in general practice, to those

¹ Presented at the thirty-second annual meeting of the New York State Veterinary Medical Society, Syracuse, July 26, 1922.

who constitute the great majority, for it is in your ranks that the derelict has operated. This judgment is far-reaching in scope; it has become almost a tradition. And while many enjoy the rights, privileges and honor pertaining to a learned profession in their own communities, we all feel, in various ways, the general effect of an untrained professional ancestry. It is as hard to dispel as the conception that night air is dangerous, and unfortunately is not confined to those outside the profession.

Certain outstanding colleagues develop chills over the possibility of an organized expression from the practitioner. The feeling that you are bound to commit a fault can not be dispelled. A few years ago I was consulted on the selection of topics for the section on practice in the A. V. M. A. I suggested "State Medicine in its Relation to the Practitioner." After apparent consultation with the proper authorities (they still retain the authority), this subject was rejected on the pretext that it was not of sufficient importance to merit a place on the program. It is superfluous to add that my counsel in such matters has not since been requested. The fact that "State Medicine" did have some interest was demonstrated later in a safer environment.

A few years ago, before giving any thought to this phase of veterinary science, I was surprised to hear a representative of one of our large universities state that he was in search of a man to take charge of the work on diseases of animals and that he would not have a veterinarian. Veterinarians, said he, are always at loggerheads with one another and he proposed to secure an animal pathologist. There is some compensation in observing that his selection has acquired national fame in the field of absurdity.

The evident conception of our State Department of Education of what constitutes a veterinarian under the law, is not flattering to one's pride. Of course some of this may be charged to the reactionary regime of that department, so fittingly described in recent numbers of the Druggist Circular.

This recital is not to condemn or extol any department, bureau, or individual, but to illustrate principles that merit the serious thought and judgment of all. It is no exaggeration to state that as a group we are poorly educated in the problems that affect the profession as a whole, and impotent as an active

influence in their solution. It is a logical sequence that we accept the verdict of others. And while such verdict is usually the result of honest opinion, it sometimes lacks the wisdom of broader counsel.

This situation is one of the fruits of an educational system that has passed, and even though you are not a part of its product, the shadow is all-inclusive. The small size of our profession and the comparatively small number of immortals who have honored its past in this country, place upon us a greater responsibility to maintain its ideals and establish its just position. The professional experience of a veterinarian is almost entirely individualistic; with few exceptions he operates alone and is exposed to the dangers of seclusion. Knowledge that does not come his way may remain unknown. Advantages that are not thrust upon him he often fails to enjoy. His wrongs, real or imaginary, are too often opposed by futile oratory. This experience develops individual independence and resourcefulness, but these alone are insufficient in our complex, modern civilization. The age of individualism has passed. The challenge of our time calls for harmony of effort, aggressiveness in the use of public facilities for the solution of daily problems, enthusiasm for learning, and frequent submission to instruction from others. This is the path traveled by men who assemble in all branches of learning, as you have done here. Without this spirit the first flash is the last, associations fade, new knowledge accumulates in a discouraging mass, and the intellectual epitaph is at hand. Professional education is a cooperative function, complex in nature, and terminated by indifference.

Some of our new educational problems are well expressed by Sir George Newman in an address entitled "The State and the Future of Medical Practice," presented at the 88th annual meeting of the British Medical Association. It reads in part as follows:

Consequent new relations between State and doctor have brought profound changes. They divert, in a handful of years, the whole course of applied medicine from its century-old pathway. They do not abolish the private medical practitioner, but they bring him in a different relation to the State. Their present and future relation must be confirmed and made good on both sides, for, on the one hand, the profession is conscious of

new obligations, both those imposed by law and those imposed by a sense of what is demanded by the civilization in which they live; and, on the other, the State is conscious, as never before, of the community's need of the profession's help if sought on the right terms and given in the right spirit. The greatest need on both sides is understanding. Value is the result of the application of mind and matter. The new problem is for State and profession to come to a realization of the principles which should govern their inter-relation. It is an association peculiarly difficult. For historical reasons the State (which means for the present purpose all authorities, local as well as central, concerned with health) has seen *prima facie* in the profession a body insistent upon the privacy and individuality of its work, the sanctity of its traditions, the freedom of its engagements. Correlatively, the profession has seen in the State an organization apparently devoted to the infringement of these traditions and incapable of putting anything worthy in their place. It has been suspicious and mistrustful of what it considers to be unnecessary intervention. It has feared the imposition of some cast-iron system, some form of so-called "nationalism," the institution of a whole-time civil service, which might in practice make the practitioner of medicine servile, dependent and fettered.

What can improve the relation? The answer to this question seems to be—a larger measure of understanding by the doctor of the business of central and local government as representing the whole community, and by the State and its officers and representatives, high and low, of the history, development, and genius of professional character. The doctor should know something of the respective functions of Parliament, of the Cabinet, of the Treasury, of the dozen departments dealing with health problems as subordinate to their main functions, of the Ministry of Health (medical and lay), and its Medical Consultative Council. Further, he should know the meaning of the English system of local government; how it is evolved; why the country is divided into shires, boroughs, urban and rural districts and parishes, and what the main purposes are of the respective bodies providing for health, pensions, Poor-law, education and insurance. For it is only by such knowledge, inspired by the historical spirit, that the doctor can obtain a grasp of the machinery by which and through which he can render his communal service to the State. He will discover, incidentally, the working of some of the great principles of representative government and the guarantees of its freedom. The layman should learn so much as he can of professional tradition and sentiment, of the scope and opportunity of voluntary work which touches the profession, of professional organizations, and of their history and relation to each other.

Such knowledge on both sides has a direct bearing on the

effective working of the extended relations between the profession and the State which it is now recognized are inevitable. It would enable doctors to understand those necessary and, at first sight, rather remarkable limitations of Government action, which at present he deems to be merely stupidity. For instance, in official work regard must be paid to uniformity, to a "national minimum," to what is practicable rather than what is desirable, to the restrictions of the law, and to public economy. The layman in his turn will learn why doctors are jealous of their *private* practice, * * * of the whole personal nature of their relations with their patients, and of professional honor, integrity, and etiquette. These matters are not merely expressions of idiosyncrasy, prejudice, or narrowness of mind. They have behind them a long history, sound reason, and something of a philosophy. Some of them may be vestigial remains of a dead past; others have come to us, living, virile, and purposive, across 2500 years from the days of Hippocrates.

The general effect of this suggested change of outlook would be that the doctor become more political in the true Greek sense, and not with any partisan or meretricious meaning, but rather in the sense in which man was described as a political being, conscious and considerate of the community in which he lives; and Whitehall and local authorities would realize how far short they are of full understanding of the profession, with whom they must work, and of its growing cohesiveness, its quest of truth, and its undying spirit of "love of humanity associated with love of craft."

This masterful discussion of the principles of modern applied medicine contains for us wise suggestions. It offers a precedence to inquire and a memorandum of topics adaptable to our institutions and our situation. How many of us are familiar with the public organizations through which we function; the authority for their establishment, the scope of their power, the influences to which they are susceptible, the titles or the names of their personnel?

Within the scope of this educational program may well be included several topics that are the subject of much talk, that exert a profound effect upon our reputation, and that we as a society have largely ignored.

Perhaps the chief of these, the one that has reflected the most harm, is that of moral delinquency for mercenary purposes in the performance of public duty. No less a person than the Chief of the STATE Bureau of Animal Industry informed the New York Agricultural Conference Board in the presence of

one of your committees that in 1918 the tuberculin test of every private practitioner in the State was tabooed throughout the country. This statement was challenged by a breeder who knew better. But it reveals that from some quarters we are not even credited with sufficient self-respect to react against aspersion of character; that we will patiently function as a general repository for all suspected or real acts of dishonor that fall within the theater of our operations.

We may well disclaim perfection of character, the extent of our fault we thoroughly comprehend; it is not limited to any single group, but its capital stock has been tremendously watered by outsiders. In self-defense, in the interest of our moral and professional reputation, and in support of efficient and honest administration, this Society should organize behind a definite constructive program. Our first duty is to increase membership until it includes every eligible man in the State who is not a hermit and does not proclaim the faith of isolation practiced by the Druids. One year ago an apparent lack of interest was attributed to disharmony. This diagnosis is wrong. Disharmony may appear, but this Society is not now in that stage of development. Apathy is a better word. Authorities in agricultural organization chide us with lack of leadership. Nothing is to be gained by consultation. Even laymen have made the diagnosis. What is needed is a change of atmosphere and a little more exercise of community spirit.

The results accomplished by your committees through discussions with the Commissioner of Farms and Markets, and representatives of agricultural organizations have convinced them that you stand for principles as opposed to superficial interests. We are fortunate in the personality of these men, who have recognized in your committees a type of professional consultant bringing high ideals and sound advice. They welcome such counsel and they will unite with us in the support of any program for the advancement of veterinary science. We have a common purpose. Such union promotes understanding. We profit by their strength, and they by our counsel. No greater opportunity or higher obligation has ever come before this Society than that involved in the promotion of this policy.

The statement of Sir George Newman, that the problem of realizing the principles which should govern the inter-relation of the State and the profession is difficult, will meet with few

denials. You are vitally interested in the principles to be established in the State of New York. The time seems to have passed when disagreement on principle is interpreted as a cry over the loss of a job. Better understanding has shown that our motives are worthy of our enterprise—the preservation and development of a profession essential to the control of disease and the promotion of an industry fundamental to all nations that are not vegetarians. This is our motive, and this we accept as the motive of the most enthusiastic exponent of State medicine, notwithstanding recent information that indemnity discriminations are necessary to *keep busy* regular employees. What merit is there in a regulation for a Bureau that makes no higher call on the taxpayer than insurance against loafing? When did the government establish the principle of voting a subsidy from our left-hand pocket to stifle a fundamental enterprise that it has fostered from our right? This tangle between State and private veterinary service in New York is due, not to a defective law, but to a perverted bureaucracy which vacillates between individual favoritism on the one hand and meddling, restrictive paternalism on the other. Until better stability develops it will continue to malfunction in the administration of both public and private service for the control of animal disease. This, gentlemen, is a theme worthy of careful thought and candid debate. I would present a parallel drawn by Professor G. F. Warren to illustrate the identity of the principle involved here, with that involved in the operation of national banks and the inspection of grain for export.

National banks are conducted by private enterprise; they are accredited by the government, and are subject to inspection and supervision by Federal employees. Grain for export is classified by inspectors who are registered by the government. But the government does not classify the grain; this is a private matter between the inspector and the exporter. Registered grain inspectors, like bankers, are subject to scrutiny by Federal agents who are not known and whose arrival is not announced. The principle that the government should engage to perform the actual work of a vast enterprise to the derangement of a private service far better fitted by virtue of numbers, experience and location, is indefensible under our form of government. It invites favoritism and discrimination through lack of employees; the work at best is fragmentary; it is unduly

expensive and its reaction on the development of an essential profession is destructive. Would not more be accomplished in this State by a cooperative plan that would encourage and utilize private enterprise instead of eliminating it? If another plan is better adapted to other States, that is not our affair.

Recent events seem to indicate a more favorable attitude towards the effective utilization of all the different elements that have a common objective. There would seem to be no legal or constitutional objection to organizing along the lines followed by bankers and exporters. If my information is reliable, the agricultural industry of this State favors such a plan. The National Secretary of Agriculture has approved of the principle, and the Chief of the Federal Bureau of Animal Industry writes your President that where you find reactors in fully accredited herds the Bureau is in sympathy with and favors payment of indemnity. Having agreed on the principle, it would seem that its operation could not be indefinitely delayed.

With this brief outline of a few of the more important questions incidental to our service to the public and the State, I would commend for your thought the words of wisdom spoken by that older Cassius:

“Men at some time are masters of their fates:
The fault, dear Brutus, is not in our stars,
But in ourselves, that we are underlings.”

BLACKLEG VACCINE

- From August 1, 1922, the Canadian Department of Agriculture has discontinued the manufacture and sale of blackleg vaccine. The distribution of this vaccine was undertaken many years ago with a view to encouraging owners to vaccinate their cattle against blackleg.

Blackleg vaccines are now manufactured by a number of commercial institutions and can be purchased without difficulty either direct from the manufacturer or through local agencies, veterinarians, druggists, etc. Furthermore, blackleg vaccine is now prepared and sold in different forms and the newer products, such as blackleg aggressin and blackleg filtrate, are replacing to some extent, the old blackleg vaccine in the form of pills, pellets, and threads.

The U. S. Department of Agriculture also ceased the preparation and distribution of blackleg vaccine on July 1, 1922.

VETERINARY WELFARE ¹

By N. S. MAYO, Chicago, Illinois

THE WELFARE and progress of our profession depend ultimately upon the ability and efforts of each individual member. There is no royal road down which progress marches joyously dragging unwilling and lagging members along. It is true that a few hope to make some progress through the efforts of others, but their advance is not great. Each individual must make some progress or go backward. There is no standing still.

The welfare and progress of our profession must begin at home, that is, with the individual. Every member of our profession should realize the responsibility that is his. He is the representative of our profession in his community, and that community will measure the veterinary profession largely by the standard set by the local veterinarian, professionally, ethically, socially and by the service he renders to that community.

Veterinary welfare also depends upon the opportunity for service and the real service that the veterinarian can render to humanity. The pecuniary return is important, but there are other things besides money that make for our welfare also.

The first essential to our welfare is the general and technical training of the members of our profession. Upon one's general training, as well as technical, will we be measured, at least in comparison with the so-called learned professions. We know that the standards of training are higher than ever before, and that the facilities and equipment are better and much progress is being made in the fundamental training for our profession.

Another important factor in the progress of our profession is the increased information available that enables us better to solve the many professional problems that we encounter. Research workers are adding their scientific contributions that are of great practical value. I can not omit the splendid work of Dr. Maurice Hall in demonstrating the value of carbon tetrachlorid for the treatment of intestinal roundworms in animals and man. Every practitioner can do his part by contributing to association meetings such as this, or sending to the veterinary

¹ Presented at the Missouri Valley Veterinary Medical Association meeting, Omaha, Nebr., July, 1922.

journals the results of his own research and experience in everyday practice. There is room for great improvements here and an opportunity for every one to contribute to the welfare of the whole.

Another great factor in our professional welfare is the establishment of cordial relations with the farming and livestock industries upon which our profession is dependent. This should be done not only by our individual bearing to others in our daily contact but through various agencies that are working to advance the farming and livestock industries, farm and livestock organizations, county agents, the local press in rural communities, as well as livestock and farm papers of general circulation.

Harmony is absolutely essential to welfare and progress. Just as surely as home life is ruined by quarrels and controversy, so are professional progress and welfare ruined by strife within our ranks. Nothing in this world is absolutely perfect. If you know of errors that need correcting, go at it courteously and fairly, straight to the heart of the matter, and every one will appreciate your efforts to make things better in the proper way, and you will have the assistance and support of all fair-minded men.

Other important factors in our professional welfare are our professional associations. It is our duty to join such associations and unite our efforts with our professional associates for the advancement of our professional interests in every direction. In union there is strength. By our associations and their work is our profession judged in the State and nations outside of the community that measures our individual efforts. Every veterinarian should join the local veterinary association, the State association and the national association, for they afford the best opportunities for advancing our interests and promoting our welfare as a whole.

Our profession is just emerging, or possibly better said, just beginning to emerge from a serious depression that has affected every one, not only financially but psychologically. I do not think it has hit us harder than it did the farmer and stockman, but certainly hard enough. Quite a few veterinarians gave up their profession and entered other lines of work; the attendance in the veterinary colleges was greatly reduced, and we all felt

blue and "bolshéviki." It was, however, a world-wide depression that is gradually disappearing. Such conditions occur at times. There are some of us who recall a more severe period of depression in the early nineties, that still have painful memories. We lived through it, and we believe that we profited by the experience.

We believe that times are improving materially and that the outlook for our profession is good. There is no country in the world that is so favorably situated, economically, socially and politically, as the United States of America. There is no country in the world where people live so well as we do, or have greater opportunities for enjoying the real pleasures of life. So let us be optimists. Let us strive to improve ourselves in professional lines by attending association meetings, and by taking and reading the best veterinary literature available. Let us be charitable, sympathetic and helpful to others in our professional and outside of it. Let us give the very best service possible to our clients. Let us do our work to the best of our ability and conduct ourselves as professional gentlemen, and the future welfare of our profession will be established beyond question.

TRY IT AGAIN

Here's to the chap
With the smile on his map,
Though fortune has dealt him a thunderous rap
And knocked him clean on the rear of his lap—
Whose only remark is, "Gee whiz, what a slap!"
I'll try it again!"

I'm there with the guy
With the gleam in his eye,
Though Fate has let loose a stiff punch in the eye,
And has scattered his pride all over the sky,
Whose only retort is "Doggone it if I
Don't go ye again!"

I'm strong for the brick
With the courage to stick,
Though Failure has hounded him like the Old Nick,
Who cries out at last, "Now I'm on to the trick!"
And camped on his trail when the going was thick,
Let's try 'er again!

CLINICAL AND CASE REPORTS

(Practitioners and others are invited to contribute to this department reports of unusual and interesting cases which may be helpful to others in the profession.)

PARALYSIS OF THE PENIS IN THE HORSE

By JOHN W. ADAMS

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Philadelphia, Pa.*

INABILITY to retract the penis is seen most frequently in the horse. During the late World War hundreds of cases occurred among the horses along the lines of battle, and while the causes are conjectural (embolism, thrombosis, lesions of lumbar cord or meninges, peripheral neuritis, etc.), the affection seemed to be in some way intimately associated with overwork, underfeeding and exposure to the rigors of winter weather.

The typical case is neither a paraphimosis nor a phimosis, but is simply a paresis or a paralysis of the retractor penis muscle.

Medical treatment is of no value. The surgical treatment recommended has been amputation, but as this is uniformly followed by stricture of the urethra, dilation of the bladder, and sooner or later death of the patient. Regardless of the method of amputation, this method of making a horse presentable is but a temporary expedient.

In 1906 I had occasion to excise numerous papillomata from the interior of the prepuce and skin covering the penis of an old, undersized grade stallion used exclusively for draft. The wounds healed promptly, but from that time the horse could not fully project the penis. In fact, so much of the skin covering the penis between the glans penis and orifice of the external prepuce had been removed that subsequent cicatricial contraction limited protrusion of the penis by approximately one-half.

This unlooked for result suggested to me a means by which a paralyzed penis might be mechanically held within the outer prepuce and render amputation and resulting stricture of the urethra unnecessary. As cases were presented during succeeding years, I experimented to ascertain the amount, location and shape of skin to remove, the best method of approximating the

skin around the denuded area and of holding the penis till healing had taken place. Since 1910 no important modification has been made and I will describe briefly my present technique of "reefing" the skin of the penis. A sailor shortens sails by taking up a fold ("reef") and tying it in place,—he does not cut the tied fold away. I shorten the investing skin of the penis and limit protrusion by taking up a circular cuff or reef, suture it in place, but do cut away the reef.

Reefing the Penis.—Indicated in geldings with paralysis of the penis. Cast on table or ground. Chloroform anesthesia desirable but dispensable. Wash penis and prepuce. If the penis is rigid through engorgement of corpus cavernosum it can be readily softened by bending and manual compression till it is flaccid and can be pushed well back into the external sheath. With the penis fully extended and a catheter within the urethra, make a circular incision through the skin just anterior to the base of the edematous fold (inner prepuce) that encircles the glans penis some five or six inches from its end. A second circular incision is then made around the base of the penis. The distance between these two circumscribing incisions will depend upon the width of the fold that you can pinch up on opposite sides of the penis without rendering the skin on both sides of the fold so tight that the sutures will tear out.

The position of the distal circular incision is fixed. The distance from it to the proximal circular incision is approximately two-thirds of the distance from the end of the sheath to the end of the pendant penis. In other words, if the penis hangs twelve inches out of its sheath, the width of the cuff to be removed will be about eight inches.

The hemorrhage will be negligible, because the large veins in the loose subcutis need not be severed. Join the circular incisions by one longitudinal incision and dissect away the cuff, avoiding the large veins lying upon the surface of the tunica albuginea.

Remove the catheter. Join the edges of the skin by four mattress tape sutures equally disposed around the penis. Place three interrupted silk sutures between each two tape sutures. Dust the line of suture with an antiseptic and astringent powder. The end of the penis should now project five to eight inches beyond the prepuce. When healing has taken place some two to three weeks later, the end of the penis should come to rest

some one to three inches beyond the sheath, so that urination will occur outside of the sheath.

A triangular suspensory diaper of muslin attached by the corners to tapes passing around the loins and between the hind legs will help support the penis until cicatrization has occurred. The tape sutures should be removed in about fourteen days.

This operation gives permanent results; is not followed by stricture because the urethra is not invaded; is not followed by blinitis because the urine is voided outside the sheath. A stallion with paralysis of the penis can get an erection and is not prohibited by the paralysis alone from breeding mares. If this operation is contemplated, the stallion should be castrated a month or more before reefing the penis is done.—*U. of P. Bulletin, Veterinary Extension Quarterly, No. 7, July 1, 1922.*

INCREASE IN PIG CROP MAY OFFSET PORK SHORTAGE

A net increase of 14.5 per cent in the number of young pigs produced last spring in the Corn Belt States is shown in a special pig survey by the United States Department of Agriculture. This increase may overcome the shortage of meat stocks.

The survey shows a gross increase of 22.8 per cent in the number of spring litters this year as compared with the number of litters born last spring, but the average number of pigs saved per litter is 7 per cent less than last spring. The April 1 brood sow report of the Department indicated a net increase of 15.6 per cent in pig production this spring over last year.

Stocks of pork products other than lard in storage May 1 were 33 per cent less than the five-year average, and 26 per cent less than a year before. Lard stocks May 1 were 16 per cent less than the five-year average and 37 per cent less than in 1921. Stocks of other meats were correspondingly low.

The survey indicates a prospective increase of 49 per cent in the fall farrowings in these states over last year.

The survey is based upon about 200,000 schedules received from farmers in the Corn Belt States which produce about 70 per cent of the pigs in the United States, and from farmers in the Eastern and Southern States.

ABSTRACTS

INVESTIGATIONS RELATIVE TO INTERCHANGEABLE VACCINE IMMUNITY AND FOOT-AND-MOUTH DISEASE IMMUNITY IN CATTLE AND GUINEA-PIGS. P. Uhlenhuth and W. Bieber. *Klin. Wehnschr.*, 1 Jahr, No. 13, April 8, 1922. (Translation.)

While carrying out experimental studies with vaccine, we decided to include the question of the immunizing relations between foot-and-mouth disease and vaccine in our investigations. Although the Prussian Commission for Investigating Foot-and-Mouth Disease (Loeffler, Frosch and Uhlenhuth) had given a negative answer to this proposition in 1898, reports were constantly appearing in the literature, which declared that cattle having recovered from vaccine infection always possessed protection against foot-and-mouth disease.

There was always a possibility that by the simple vaccinations used by the above named commissioners, no protection was afforded against foot-and-mouth disease. Three young cattle were therefore injected intravenously with larger amounts of vaccine lymph. These three cattle were treated in the same manner from August to October, 1921, becoming highly immunized. They had never been exposed to foot-and mouth disease. Two of them were then placed in a stable at F. near Munich, where foot-and-mouth disease existed in a severe form, that they might be exposed to the disease by natural infection. The test cattle stood between cattle that were very sick (one of these died). Material from the mouths of the sick cattle was repeatedly brushed into the mouths of the test animals. Except for a slight elevation of temperature which quickly disappeared, these young cattle showed no indications of foot-and-mouth infection or of having contracted any other disease. All the remaining cattle in the stable became sick. The control and the continuous observations of the test animals were made by District Veterinarian Rasberger of Munich through the kindness of the Bavarian Ministers. These results led us to continue our investigations. A large number of cattle were highly immunized against vaccine, some intravenously, some intraperitoneally and others by means of scarification, while a few were treated simultaneously with intravenous injections and

cutaneous applications. Various amounts of serum were used upon individuals of the several lots. It should be mentioned here that the intravenous injection of large amounts of serum often led to threatening symptoms immediately after the injection (tumbling about, distressed breathing, etc.). The cattle receiving the largest amounts were each given 5, 10 and 10 c.c. of glycerin lymph of the usual dilution intravenously. It was then discovered that the skins of animals that had received but a single preliminary treatment were perfectly immunized at the time of later scarification, even weeks and months later. The corneas of the cattle which we examined with Prof. Grüter of the eye clinic, even those from cattle receiving three injections as preliminary treatment failed to show complete immunity, although they gave a reaction that was much lower than that given by the eyes of controls. In general the vaccine process ran a longer and lighter course on cattle than it did on rabbits (there was less tendency to ulcer formation), a fact which we proved by comparative tests with several samples of lymph.

We noticed almost invariably, after intravenous or cutaneous treatments that pustules, papules and red spots, similar to those produced in rabbits and guinea-pigs by vaccinating, contained vaccine virus, would appear within or around the mouths of the test cattle. These slowly disappeared without leaving any scar.

The third treated bovine was sent to F. near Munich, where with six other young cattle, all highly immunized against vaccine, it was placed in a stable near Marburg where foot-and-mouth disease had just appeared. Here they were exposed to natural infection, and during the whole test were carefully observed by the writers. All of the cattle contracted foot-and-mouth disease. Most of them, however, had the disease in a very slight form (no blisters formed between their claws. A portion of the highly immunized cattle were then injected intraperitoneally with germ-free lymph for the purpose of obtaining serum to be used in the treatment of patients sick with smallpox.

We next tested the variability of immunity on guinea-pigs. After inoculating on the skin of the metatarsal region (with slight cuts) local lesions appeared upon the guinea-pigs similar to those produced by inoculation with foot-and-mouth virus. The vesicles remained longer, 3 to 5 days, while those from

foot-and-mouth inoculations usually become fully developed in 24 hours. The vaccine vesicles usually remained in the metatarsal region while those of foot-and-mouth disease frequently extended to the toes. At the right time rich, clear, lymph may be drawn from the vaccine vesicles. Through continuous reinoculation of such vesicle contents we have produced a guinea-pig strain ("cavine") which remains unchanged when used on these animals and leads to the development of beautiful vesicles.

We also learned that guinea-pigs are useful animals upon which to execute vaccine studies. We used them in intracutaneous experiments (for standardizing lymph, etc.). The 16th and 20th passages were rubbed upon the scarified skin of a young bovine, but showed no increase in virulence. This experiment was repeated to see if the serum had lost any of its virulence for cattle. Through cutaneous inoculation on the metatarsal skin and upon the skin of the posterior part of the abdomen of guinea-pigs, which treatment resulted in the formation of vesicles, also through intraperitoneal and subcutaneous inoculations of germ-free lymph, we have prepared many series of immune guinea-pigs. No abscesses follow the use of germ-free lymph. Guinea-pigs treated in the above manner are fully immune to vaccine. They will, without exception however, develop foot-and-mouth disease if foot-and-mouth virus is rubbed upon the scarified skin over the metatarsal region. The course of the disease with these treated guinea-pigs is precisely the same as that shown by the controls that received no preliminary treatment. On the other hand we have infected guinea-pigs with foot-and-mouth disease after they had been immunized against vaccine. They developed blebs and vesicles just as did the untreated controls. Simultaneous inoculations with vaccine virus upon one foreleg and foot-and-mouth disease virus upon the other foreleg of the same guinea-pig, resulted in perfect inoculation results in both instances. Simultaneous inoculation of one foreleg of a guinea-pig with foot-and-mouth disease virus, giving intraperitoneal injection of vaccine virus also resulted successfully.

Although rabbits are less suitable for these tests than guinea-pigs, the results obtained by subjecting them to identical tests with guinea-pigs were always the same.

No interchangeable influence between foot-and-mouth disease

immunity and that derived from vaccine virus could be demonstrated in our experiments. The positive results obtained with two young cattle at F. near Munich we are at present unable to explain.

H. J. WASHBURN.

CANCER IN HORSES. E. Césari. *Recueil de Médecine Vétérinaire*, vol. 98 (1922), p. 171.

During the course of a study of the etiology of cancer, 20,000 mares, 16,000 geldings and 3,600 stallions were examined post mortem at an abattoir with the view of obtaining data on the frequency, locations, etc., of cancer. Systematic exploration was made by palpation, and if necessary, by incision of the testes, ovaries, udders, kidneys, adrenal glands, lungs and livers. Frequently, small cancerous nodules were found imbedded in the organs, which ordinarily would escape attention. Malignant tumors only (epithelioma) were studied and counted; 184 or 0.46 per 100 were found. Cancers occurred most frequently in stallions, the testicles almost always being affected first (1.38 per 100). In geldings the kidneys were most frequently invaded (0.22 per 100). In mares, the udders were first and kidneys second in the number of cancers. By far the bulk of the 184 cases were included in the 50 testicles, 45 udders and 62 kidneys. There were but 2 cancers in the ovary and 1 in the uterus. Diagnoses were always checked by histological examinations. Dark-coated horses have cancers about three times as often as light-coated ones. The horses killed at the abattoir were mostly past 15 years of age, but four cases of cancer were observed in horses under 12 years. On the subject of etiology nothing was recorded.

W. N. BERG.

IS IT NECESSARY TO KILL DAIRY CATTLE WHICH REACT TO THE TUBERCULIN TEST? A. Calmette. *Rev. Vét.*, vol. 74 (1922), no. 6, p. 356.

The advice of Prof. Calmette was sought regarding a measure proposed by the Council of Hygiene of the Department of the Aisne requiring the tuberculin testing of all cattle furnishing milk for public consumption and the slaughter of all reactors. Viewing the problem purely from the sanitary point of view Calmette does not believe that the measure is acceptable in its present form. The following points are brought forward in support of this stand:

The tubercle bacilli adapted to the bovine species have acquired specific morphological and cultural characters and pathogenic qualities clearly differentiating them from human bacilli. They are rarely encountered in tuberculous lesions of man (4 to 10 per cent of tuberculosis of children and 0.3 per cent in adults). Statistics obtained by C. Guérin in 1910 showed that the mean proportion of animals reacting to tuberculin in France was then about 16.5 per cent; more recent figures show that the situation is still more serious. The proportion of reactors of dairy cattle permanently stabled exceeds 40 per cent and in dairy breeding cattle the percentage ranges from 30 to 16. On December 20, 1921, there were in France 18,264 infected farms and 144,065 tuberculous cattle. The total bovine "population" in France in 1920 was 12,767,720 and the number of tuberculous cattle not less than 2,000,000. If all French cattle reacting to tuberculin were held for slaughter the production of milk would be reduced one quarter and all other conditions remaining the same the price of milk already high would increase in the same proportion without resulting in any appreciable advantage to the public health. The latter can be more effectively protected by requiring that milk should be placed on sale only after it is freed from tubercle bacilli by boiling except when it is produced by cattle frequently and regularly tuberculin tested and under the permanent control of veterinarians. The milk should be delivered in sealed vessels.

The problem of eradication of bovine tuberculosis should be regarded especially from the economic point of view and its solution should be the task of the veterinarian and the breeder. Success will not be attained by meddlesome and impracticable regulations but by a better organization of stable hygiene, by seeking out, isolating and early slaughter of animals with open lesions. It is inadmissible that cattle showing no apparent or clinically detectable lesions, whose mammary glands are not affected, whose milk does not contain tubercle bacilli and whose general condition is excellent can not be saved for milk production.

L. T. GILTNER.

NOTE ON THE PERCENTAGE OF TUBERCULOUS CATTLE. L. Sausseau. *Rev. Vét.*, vol. 74 (1922), no. 6, p. 362.

Sausseau calls attention to the fact that Calmette in his report (see above) has probably overestimated the prevalence

of tuberculosis in French dairy cattle. Tuberculin tests made by the sanitary veterinarians are confined to little more than the tests on farms known to have the infection. Save in rare exceptions, herds not suspected, are not tested. The official statistics give the percentage of reactors in known infected herds and not in all of the herds. The stables supervised by the Sanitary Service contain a higher average of tuberculosis than those on the outside and probably many of the latter are healthy. If all cattle were tested indiscriminately it would result in materially lowering the percentage of positive reactors. In Calmette's reference to the statistics of December 20, 1921, he assumes that all of the 144,065 cattle on the infected farms are tuberculous, whereas in fact only a certain proportion of these reacted to the test.

Sausseau does not wish to deny the ever-increasing prevalence of bovine tuberculosis but to correct the tendency to exaggerate the degree of infection of French cattle on the basis of exact statistics, but improperly interpreted. L. T. GILTNER.

A BRIEF ACCOUNT OF A DISEASE IN CATTLE SIMULATING HEMORRHAGIC SEPTICEMIA DUE TO FEEDING SWEET CLOVER.
F. W. Schofield. Canadian Record, vol. 3 (1922), no. 2, p. 74.

A cattle disease occurring in two forms, a hemorrhagic type and an anemic type, has been observed following the feeding of sweet clover. The feed was coarse and moldy and consumed either as hay or ensilage. No cases were found in animals fed fine ensilage or a fine hay free from mold. In the hemorrhagic type there are subcutaneous swellings, small at first but increasing in size until they attain a circumference in some instances of several feet and from 4 to 6 inches in thickness. The swellings are non-inflammatory (no heat or tenderness) and contain blood and plasma. There is no elevation of temperature, the pulse is accelerated and weak, appetite not entirely suppressed; visible mucous membranes blanched, gait is stiff, constipation present, posterior paralysis may occur. Clinically all that can be observed in the anemic type are pallor of the mucous membranes and lassitude. Death usually follows some operation, such as dehorning. The blood is thin and watery and fails to clot or clots very slowly.

At autopsy in the hemorrhagic type, the superficial swellings

are found to contain clotted blood, semi-gelatinous material and serum. Throughout the body there are innumerable petechiae and minor hemorrhages. In the liver small dark spots about the size of buck-shot occur, just beneath the capsule, the muscular pillars of the left heart show well marked ecchymoses. In the anemic type no large hemorrhages are found, but petechiae and ecchymoses may be found in any of the serous membranes. The carcass contains a small quantity of thin blood which coagulates very slowly.

Experimentally the disease was produced in calves and rabbits by feeding moldy sweet clover hay or ensilage. Bacteriologic examination of tissues from natural cases were completely negative for hemorrhagic septicemia.

L. T. GILTNER.

WINE IN SURGICAL ANTISEPSIS. L. di Lucea. *La Fir. Med.*, 1921, no. 32. Abst. in *Zeitschr. f. Tuberkulose*, vol. 36 (1922), no. 3, p. 228.

Severe surgical infections (wounds, abscesses, phlegmons, open tuberculous lesions, etc.) were cured by treatment with the naturally pure wine from various sources and of an alcoholic content of 12-15 per cent. There was a surprisingly quick drying up of the purulent discharges and a luxuriant development of healthy granulations and this occurred when other antiseptics had failed. The wine was applied undiluted or in different dilutions as a wash for the parts or in tampons or packs. Continued or frequent washings were not necessary. Tuberculous lesions were likewise favorably influenced though perhaps to a lesser degree. The wine causes neither pain, burning nor irritation of the neighboring skin and is recommended largely in warm applications. Laboratory experiments are still being carried on.

L. T. GILTNER.

RESEARCHES INTO THE SEROLOGICAL DIAGNOSIS OF CONTAGIOUS PLEUROPNEUMONIA OF CATTLE. G. G. Heslop. *Roy. Soc. Victoria Proc.*, n. ser., 33 (1921), pp. 160-211. (Abst. in *Expt. Sta. Record*, vol. 46, p. 582.)

This is the report of an extensive investigation of contagious pleuropneumonia of cattle, with particular reference to its serological diagnosis.

Following a brief review of the literature on the disease, preliminary cultural and filtration experiments are reported. It was found that Martin's peptone bouillon with the addition of 7.5 per cent of normal ox serum is the best medium in which to obtain primary cultures of the organism involved. Growth takes place under aerobic conditions with an optimum incubation temperature of 37° C. Cultures thus obtained are capable of filtration through a Chamberland F. filter candle if the culture is first diluted with from 1 to 2 per cent of Martin's broth (without serum). Growth in Martin's broth serum media is recognizable after approximately 21 days by slight opalescence, for the recognition of which it is necessary that uninoculated tubes of the same broth be incubated at the same time. Animal inoculation should be used to confirm the identity of the organism.

The agglutination test was found to be without value in the diagnosis of the disease, but the complement-fixation test, if carried out by the special technique developed by the author, yielded reliable results. The main difficulty in carrying out complement-fixation tests for the diagnosis of contagious pleuropneumonia is thought to be the prevention of errors arising in the test owing to the presence of conglutinin in the serum. Since the amount of conglutinin present in bovine sera differs very considerably, it is necessary to titrate each test serum separately to determine the proper quantity to use in the final test. An alcoholic extract of subepidermal tumor tissue from a diseased animal is considered the most suitable antigen.

THEORY OF TUBERCULIN REACTION. Rosenbach. Deutsch. med. Wehnsehr., vol. xlvii (1921), p. 1581. Abst. in Amer. Rev. of Tuberc., vol. vi (1922), p. 105.

Tuberculin does not act directly as a toxin but activates the toxins derived from tuberculous foci. Only the activated toxin is injurious to the cells and produces inflammation. Therefore there results no reaction in healthy persons following tuberculin administration; and there is no relation between a positive reaction and antibody formation, because the latter's origin is from the complete, efficacious virus. The toxicity of tuberculin, Rosenbach, has been reduced by planting trichophyton on the medium, which at the same time does not diminish its immunizing qualities.

EFFECTS OF TUBERCULIN. P. M. Holst. *Tubercle*, vol. iii (1922), p. 240. Abst. in *Amer. Rev. of Tuberc.*, vol. vi (1922), p. 105.

The experiments of Römer and the phenomenon of Koch are discussed as to their bearing on immunity in tuberculosis. Koch's phenomenon is probably a manifestation of hypersensitiveness, while Römer's findings suggest that he produced a real immunity in animals. It is possible that the reinfection of animals, according to the method of Koch, may not result in a typical tuberculous wound, because many of the bacilli are carried away in the necrotic slough that appears at the point of infection. To determine this point tubercle bacilli were injected into animals intracutaneously in combination with diphtheria toxin; the toxin caused focal necrosis but the final result of the tuberculosis was not altered. By injections of tuberculin in combination with tubercle bacilli into tuberculous guinea-pigs the results were no better. It has not been proved that tubercle bacilli are able to form a genuine toxin capable of producing a neutralizing antitoxin when introduced into the organism. It has not been possible to neutralize the effects of tuberculin by incubating it with serum from tuberculous men and animals. To study the fate of tuberculin in the organism it was injected intravenously or intraperitoneally into normal rabbits and guinea-pigs; after varying intervals the animals were bled or killed and the serum was injected into the skin of tuberculous animals or was used on a very sensitive human skin for the Pirquet test. It was found that tuberculin circulates in the blood immediately after injection into the vascular system but it rapidly disappears thereafter. In another experiment, tuberculin disappeared from the peritoneal cavity rapidly and completely. Since Franceschelli showed that the total quantity of injected tuberculin can not be found in the urine till after a lapse of several hours, it is assumed that the substance must be stored somewhere outside the vascular system, since blood neither *in vitro* nor *in vivo* was found to bind tuberculin. Likewise, extract of fresh ox liver showed no power of fixing tuberculin. However, it is bound by living cells *in vitro*, as shown by using liver and brain substances; by boiling, the combination is easily broken up. Tuberculin, three hours after injection into rabbits and guinea-pigs, could not be detected in the lungs, kidneys, spleen or bowel contents.

To determine this the organs were ground and boiled with water and the filtered decoction was steamed down and pure alcohol was added. The precipitate was dissolved in water and injected into tuberculous guinea-pigs. Extracts of liver, prepared in this way, gave a slight necrosis after injection. Extracts from bones gave a distinct reaction; from muscles none. The reactions were always weaker than those from pure tuberculin. Controls were negative. It is concluded that the reaction which takes place *in vitro* by the binding of tuberculin in living tissue to a certain extent may take place also *in vivo*, and that the binding here is mainly effected by the bones. The circumstance that tuberculin can not be quantitatively recovered in the body after injection possibly means that the tuberculin now forms a new combination which we can not detect by our methods. This may also explain why we have not been able to find tuberculin in the tuberculous organism. Not until we obtain certain knowledge regarding the fate of tuberculin in the organism shall we be able to determine whether it is a true product of the tubercle bacilli or an artefact formed by the decomposition of the real toxin.

NEW OBSERVATION OF THE BIOLOGY OF THE CAUSATIVE AGENT OF FOOT-AND-MOUTH DISEASE. R. M. Allatorvosi Lapok, vol. 45, (1922), no. 8, page 54.

In Germany during recent years two promising methods have been worked out, which should prove of some value in the identification of the causative agent of foot-and-mouth disease.

Waldman and Pape (Berl. Tier. Woch., 1921, 30) observed that fresh lymph taken from a blister in the mouth of an infected animal will successfully infect the guinea-pig, heretofore believed immune. With Waldman and Pape's method, if the fresh lymph is rubbed into the posterior part of the sole of the pig's foot (plantar cushion), the skin having been previously scarified, blisters of the size of a pea will be noticed on the foot within 24 hours and within 3 to 5 days the condition becomes generalized and small blisters are seen on the volar surfaces of the feet, on the skin of the ears and in the mouth. The trustworthiness of this method has been approved by many (Ernst, Uhlenhuth, Titze). The practical value of this observation lies in the fact that the guinea-pig furnishes an economi-

cal animal for experiments in determining the value of Löffler's anti-serum as well as the blood of recovered animals.

The other promising method is that of Titze's (*Archiv. f. wiss. u. prakt. Tierheilk.*, 1921, p. 273, and *Berl. Tierarztl. Wschr.*, 1922, no. 4). He has successfully prepared liquid culture media in which he has been able to cultivate the causative agent of foot-and-mouth disease for four generations. The formula of this medium has been given only to his higher officials at the present, but from one of his works it can be seen that physically this medium resembles the lymph of the aphthous blister. After inoculation, 24 to 48 hours, the medium becomes cloudy, although no organism can be detected, either with or without stains. That the cloudiness is the multiplication of the organisms, however, was first proved because the artificially cultured medium, as antigen, with blood from recovered animals, gives positive reactions with the agglutination test; and second, because the injection of this medium into the blood of cattle produces specific antibodies; and third, because, although artificially infected animals show no symptoms of the foot-and-mouth disease, the animals do become immune against virus taken from hogs with the foot-and-mouth disease.

If further experiments corroborate his findings, Titze's discovery will be of great advantage economically, since with the artificial medium, immunization of animals may be done without danger.

M. BORSOS.

SECOND INTERNATIONAL CONGRESS OF COMPARATIVE PATHOLOGY POSTPONED

Information has been received from Prof. E. Perroncito, President of the Second International Congress of Comparative Pathology, that this congress which was to have convened at Rome, Italy, September 20, 1922, has been postponed because of unforeseen circumstances that make it impracticable to hold the meeting this year. It is probable that arrangements will be made for the convention of the congress at Rome in the spring of 1923. The date of meeting when decided will be given in a later announcement.

ASSOCIATION NEWS

TEXAS VETERINARY MEDICAL ASSOCIATION

The twelfth annual meeting of the State Veterinary Medical Association of Texas was held June 21 and 22. The body convened at the School of Veterinary Medicine, Agricultural and Mechanical College, College Station, Texas. A good attendance was recorded and many veterinarians were accompanied by their wives.

Dr. Mark Francis, Dean of the College of Veterinary Medicine, gave a very cordial address of welcome, which was responded to by Dr. R. H. Hodges, of Ranger. Dr. M. A. Peck, President of the association, Fort Worth, in presenting his address, recalled the early days of the association, its growth, and predicted for it a brilliant future.

The first paper of the afternoon session was a valuable contribution on the "Cooperation of the Veterinarian with the Live Stock Sanitary Commission," by Hon. J. E. Boog-Scott, Chairman of the Live Stock Sanitary Commission of Texas, Fort Worth. Mr. Boog-Scott spoke from the viewpoint of a sanitarian and an experienced stockman. He brought out many factors of unusual interest and many of which will tend to bring veterinarians, the Live Stock Sanitary Commission and the stock raiser into closer relationship. His paper created quite a favorable impression among the veterinarians present, and it is hoped that the association will hear from him again in the near future.

Dr. Harry Grafke, Fort Worth, Inspector in Charge of the B. A. I. in Texas, reviewed "Conditions in the B. A. I. Service." In his address he gave a very interesting and detailed report of the work being done by the B. A. I. in the State of Texas.

"Interstate and State Regulations" was the topic of a well written paper by Dr. Leon G. Cloud, State Veterinarian. Many points in the regulations were made clear by the State Veterinarian which had previously caused some confusion.

Dr. J. S. Watson, of Mexia, read a very carefully and thoughtfully prepared address entitled "Cooperation of the Veterinary College with the Practitioner."

Dr. W. G. Brock, of Dallas, presented one of the most valuable addresses of the meeting on "Canine and Feline Practice." This subject must have received much thought after close and careful observations in an extensive small animal practice. Dr. Brock has achieved quite a reputation as a small animal surgeon and his operative technique in some of the more common canine and feline operations was given in detail and evinced a high degree of skill.

"Hemorrhagic Septicemia and Mixed Infection" was ably discussed by Dr. P. P. Starr, of Gainesville. Dr. Starr presented the paper from a practitioner's point of view and many interesting things were offered that will be food for thought in dealing with these diseases.

A splendid article on "Experiences with Anthrax" was read by Dr. R. H. Harrison, Jr., Assistant State Veterinarian. This disease is gradually spreading to new areas in Texas and it behooves every veterinarian in the Southwest to be on the lookout for its appearance in his vicinity. The above paper was written after experiences with the disease in several of the largest outbreaks which have occurred in the State.

The annual banquet was held in the evening and was attended by most of the veterinarians, their wives and friends. Dr. N. F. Williams, of Dallas, presided as toastmaster at the joyous occasion.

The second day of the meeting was devoted entirely to clinics which were demonstrated at the College Hospital. Dr. R. P. Marsteller, Professor of Veterinary Medicine at the College, was clinician in charge. The clinic was varied and very extensive and apparently Dr. Marsteller and his associates had spared no efforts nor time in its preparation. Dr. A. A. Lenert, Associate Professor of Veterinary Medicine, handled the canine and feline clinic. Much interest was taken in the small animal cases, and the efficient manner which this clinic was handled enabled all to get the maximum amount of benefit from it.

Dr. R. C. Dunn, of College Station, gave a demonstration and lecture on chicken-pox. He covered the subject in a most creditable way, and had several infected fowls in the clinic for observation. The production and use of the chicken-pox vaccine was told in an exceptionally clear and impressive manner. Enterohepatitis in turkeys was also discussed in its entirety by Dr. Dunn, and before closing the clinic he was asked numbers

of questions pertaining to the two diseases. His talk impressed many of the veterinarians as to the necessity of becoming better acquainted with the rapid strides which are now being made in the diseases of poultry.

Dr. G. G. Graham, of Kansas City, made a talk on "Botulism" and clinched his lecture on the minds of the hearers by having all stages of the disease in evidence in a series of chickens. The usefulness of the antitoxin was shown in a case where a fowl had been given a prophylactic dose of antitoxin and later received a dose of the toxin. The same amount which was producing botulism in the other fowls had been rendered harmless to the first fowl by the use of the antitoxin.

Private practitioners gave demonstrations of their technique on several surgical cases. Dr. W. G. Gregory, of Fort Worth, did a cryptorchid operation which was one of the features of the large animal clinic. Many other cases were presented which were of vital interest to the veterinarian.

The success of the clinic was shown by a move being started to devote more time at the next meeting to clinics and reports of actual cases and observations from the field.

The association feels a deep sense of appreciation for the former officers—Drs. Peck, Smotherman, Scott and Blackburn—and to the members of the College faculty for the arrangements of such a practical meeting. The veterinarians of North Texas thank Mr. Geo. Mason, of Fort Worth, for his untiring efforts in obtaining a special Pullman and seeing to transportation.

Nine new members were received into the association. The following officers were elected for the ensuing year: P. P. Starr, President, Gainesville; W. G. Brock, First Vice President, Dallas; W. M. Thaxton, Second Vice President, Fort Worth; W. R. McCuiston, Secretary-Treasurer, Fort Worth.

W. R. MCCUISTON, *Secretary*.

MICHIGAN STATE VETERINARY MEDICAL ASSOCIATION

The summer meeting of the Michigan State Veterinary Medical Association was held at the Michigan Agricultural College, East Lansing, on June 28, 29 and 30. Although the weather was warm, approximately 200 veterinary practitioners from various parts of the State were in attendance. The commit-

tees in charge of the arrangements deserve much credit for the pleasure and satisfaction felt by all concerned as a result of their interest and foresight. The sessions were held in a tent pitched on the college campus. Under these conditions the environment added to the pleasure and interest in the meeting, as this college campus is considered by many as the most beautiful agricultural college campus in this country.

Dr. J. E. Wurm, President of the Association, opened the meeting on the morning of the 28th with an address which was of interest to every member present. The clinical program given in the afternoon proved unusually interesting and instructive, and the reception at the Armory in the evening was well attended. The formal address of welcome was delivered by Hon. H. H. Halladay, formerly State Commissioner of Agriculture and now Secretary of the State College of Agriculture. Dr. Wurm responded to Mr. Halladay in a very pleasing manner. The Hon. J. A. Doelle, the present Commissioner of Agriculture, gave a very interesting talk on the work of his Department. The evening's entertainment was concluded with the display of the moving picture film, "Out of the Shadows," after which refreshments were served.

The program on the 29th included various addresses: "Azoturia and Its Treatment," by Dr. L. C. Palmer of Brooklyn, Mich.; "Forage Poisoning," by Dr. B. A. Perry of Hastings, Mich.; "Laminitis and Its Treatment," By Dr. E. B. Cavell, Northville, Mich.; "Cooperation Among Veterinarians," by Dr. G. W. Cronkite, Saginaw, Mich.; "Tuberculin Test Ordinances in Cities and Towns," by Dr. F. E. Stiles, Battle Creek, Mich.; "Uniform Price for the Tuberculin Tests and Hog Cholera Vaccination," by Dr. C. C. Dauber, Sturgis, Mich.; and "The Horse Situation in Michigan," by Dr. Judson Black of Lansing, Mich.

The afternoon program of the 29th was especially interesting, since the ladies participated. Mrs. C. C. Schafer of Linden, Mich., and Mrs. J. E. Wurm, Pigeon, Mich., gave splendid addresses on the subject, "My Part in My Husband's Practice." The regular program was followed by a series of athletic feats beginning at 3.30 p. m. and a picnic on the college campus at 7 o'clock. It is needless to say that the picnic was well attended.

The members of the Association were favored on the morn-

ing of June 30 with an address by the President of the Michigan Agricultural College, Dr. David Friday. In his address he paid a tribute to the veterinary profession and the work it has accomplished in the United States. Among the features of the scientific program for June 30, the last day of the meeting, were addresses, as follows: "Acute Interstitial Nephritis in Foals," by Dr. E. T. Hallman of the College faculty; "Pathology of Lymphangitis," by Dr. F. B. Lambie, Midland, Mich.; "Milk Inspection," by Director T. H. Boughton of the Bureau of Dairying, State Department of Agriculture; a talk on the activities of the Bureau of Animal Industry, by Dr. U. G. Houck, Washington, D. C.; and a discussion of "Meat Inspection with Particular Reference to Small Municipalities," by Dr. E. P. Schaffter, inspector in charge of Federal meat inspection, Detroit, Mich.

The audience was particularly favored in the afternoon with a very interesting and instructive address by Prof. H. R. Smith, Livestock Commissioner, National Livestock Exchange, Chicago, on the subject, "National Tuberculosis Eradication Campaign." Immediately after the lunch hour, moving pictures were shown, including "Exit Ascaris" and "Hog Cholera."

All who attended this meeting went away feeling that it was one of the most successful meetings that had ever been held by the Association and all felt grateful to Mr. Halladay and the other College officials who took such an active interest in making the meeting a success.

U. G. HOUCK, *Recorder*

MAINE VETERINARY MEDICAL ASSOCIATION

The members of the Maine Veterinary Medical Association met at New Meadows Inn, Bath, Me., July 12, 1922.

The members and their wives arrived from different parts of the State and at noon sat down to a shore dinner for which the Inn is justly famous. The dinner was followed by a social hour on the lawn.

The ladies then departed on a shopping tour, which was unique in the history of such tours, as they spent no money—the stores were closed.

The meeting was called to order and much routine business disposed of.

Dr. R. E. Libby of Richmond and Dr. J. W. Baker of Fort Kent were elected to membership.

The association indorsed the proposed anesthetic law which the Blue Cross Society of America is endeavoring to secure. This proposed law will make it unlawful to perform any painful major or minor operation on any animal without the use of a general or local anethesia.

Dr. J. B. Reidy gave an interesting and instructive report on the tuberculosis-eradication conference held at Hartford, Conn., last month.

It was the opinion of medical research men present at that meeting that bovine tuberculosis could under the present system of testing be entirely eradicated from cattle.

Dr. P. R. Baird presented a paper on "Fracture of the Os Suffraginis."

Attorney Cyril M. Joly gave a talk on "Rights and Liabilities of the Veterinarian." This talk showed that the speaker was well versed on the subject and held the close interest of the members present, in recognition of which Mr. Joly was elected to honorary membership in the association.

Drs. A. Joly, A. J. Neal and C. F. Davis appointed a committee to investigate reported irregularities in applying the tuberculin test for interstate shipment.

After a lengthy discussion it was voted that a committee of five be appointed to meet and confer with government and State officials in an effort to evolve new policies in regard to tuberculosis eradication. It was the consensus of opinion of those present that the public should pay for the tuberculin test as they are the ones to receive the protection and benefit.

Mr. H. M. Tucker of Augusta was elected to honorary membership.

The next meeting will be held October 11, in Augusta.

P. R. BAIRD, *Secretary*.

KENTUCKY VETERINARY MEDICAL ASSOCIATION

The Kentucky Veterinary Medical Association met at Lafayette Hotel in Lexington, Ky., on July 12 and 13. It was indeed a criterion of the meetings held in the past several years, where harmony and good-fellowship were in abundance. Added to this were the unusually good papers presented and extraordinary good clinics conducted by Dr. J. F. DeVine. The meet-

ing was called to order by President J. K. Ditto. Commissioner Wood G. Dunlap of Lexington welcomed the association in true Kentucky manner. His description of the "Used to be South" and the present South was enjoyed by all.

He congratulated the members for having as co-workers Professors Good, Anderson and Hooper of the Kentucky Agriculture College.

Dr. McVeay, President of the Kentucky Agricultural College, welcomed the association and invited us to partake of the facilities of the college at any time we felt called upon to do so.

Response for the association was made by Dr. D. E. Westmoreland who thanked Commissioner Dunlap and Dr. McVeay. He urged the members to cooperate more closely with the college.

In the President's address, Dr. J. K. Ditto thanked the various committees for their untiring efforts and outlined in a general way the bright future of the association.

Dr. W. M. Coffee's paper on "Problems Confronting the Private Practitioner," brought forth food for thought. He emphasized the importance of conducting our profession along a more ethical line.

In the absence of Drs. Callsemier and Miller, Dr. H. Gieskemeyer read a paper on the "Physical Examination of Animals" with regard to diagnosis. He dwelt on the importance of a thorough examination of the various systems.

Dr. W. P. Moody read a paper on "Milk Fever."

Prof. J. J. Hooper's paper on "The Development of a Dairy Herd" was of considerable interest. He viewed the dairy herd from the stockman's viewpoint as well as the veterinarian's.

Dr. U. G. Houck's paper on the "Activities of the Bureau of Animal Industry" plainly showed the phenomenal strides the U. S. B. A. I. has made in the last few years.

The members of the Lexington Board of Commerce called for the veterinarians at 3 p. m. and a delightful tour of the more important stock farms was made, including a visit to "Man of War." Lantern slides were shown after dinner at the Hotel by Dr. T. P. Polk and Dr. D. Smith. The slides were arranged as a burlesque on various members of the association and all enjoyed the cartoons drawn by Dr. Smith. His slides also dealt with sanitary and insanitary conditions of barns.

The first paper on the program for the second day, entitled "Genetics of Animal Breeding," by Prof. W. S. Anderson, was a very interesting one. Prof. Anderson in his usual thorough way dealt with every angle of this subject. He produced some very important data on abortion and sterility.

Prof. Good, in his paper on "The Problems of the Livestock Breeder," emphasized the importance of eliminating the "scrub sire," stating that the progress of the livestock industry of the South depended entirely on the maintenance of purebred sires.

Dr. W. W. Dimock next read a paper on "Progress of Investigation of Sterility in Mares." His paper created considerable interest and the details and data paved the way for the papers and clinic that followed by Dr. J. F. DeVine of Goshen, N. Y.

Dr. DeVine's paper on "Abortion and Sterility" was a lengthy survey of all conditions that might tend to influence abortion and sterility. It was an interesting review without a dull moment. His clinic was the most interesting one ever enjoyed by the association. Assisted by Dr. H. Gieskemeyer, he examined ten head of cattle and four mares.

His ability to lecture and work simultaneously proved unique. Later postmortems were held on the subjects displaying conditions as outlined by Dr. DeVine in his examinations.

On account of lateness of the hour we were compelled to "cut" the balance of the program. However, the examination of veterinarians for accredited-herd work was held, about ten members being examined. This closed a meeting that we were all glad to have attended.

J. A. WINKLER, *Secretary.*

VIRGINIA VETERINARY MEDICAL ASSOCIATION

THE VIRGINIA Veterinary Medical Association met in semi-annual session in Blacksburg, Virginia, on July 13, as guests of the Virginia Polytechnic Institute. At one o'clock on that afternoon the meeting was called to order by Second Vice President, Dr. G. W. Rawson, of Charlottesville. The meeting was opened with invocation by Rev. W. C. Taylor, one of the college chaplains. Following this was the address of welcome by Dr. Julian A. Burruss, president of the college. Dr. Burruss was very generous in his welcome of our profession to the

institution, giving us the keys, as it were, with full authority to appropriate to our use all the pleasures and facilities the college could afford. Dr. T. M. Owen, a former vice president of the Association, made the response to the address of welcome, which was done in his usual pleasant and gracious manner.

Following this, Professor H. L. Price, Dean of the School of Agriculture, explained the work of the school in its relation to the entire institution and the lines of endeavor under the heads of residential, research and extension. Dean Price explained in detail the effort that is being made to extend, or carry the institution to the farmer that he may receive through the Extension Department those things which are discovered in the Experiment Station and taught to the students in the classroom.

The work of the Experiment Station along research lines, particularly animal husbandry and poisonous plants found in pastures, was explained by Dr. A. W. Drinkard, Director. This address was very interesting and of great benefit to all present. Dr. Drinkard gave the results of experiments conducted with poisonous plants found in the pastures of Southwest Virginia, particularly the mountain coves, covering three plants known as wild hemlock, Dutchman's breeches, and squirrel corn.

Dr. J. I. Handley, of Atlanta, gave a very strong address on ethical methods of advertising. He gave us many questions to ponder upon during our leisure hours.

At four o'clock in the afternoon an auto excursion was enjoyed which carried the guests to our dairy barns, experiment station, and to the new shops building. At six o'clock a picnic supper was served on the college campus by Dr. and Mrs. Chrisman to the members of the association as their guests.

At eight o'clock a business session was held over which President H. S. Willis presided, and at which the following resolution was received and approved:

Resolution of Respect.

Your committee beg leave to submit the following:

Dr. Charles Barnwell Robinson was born in St. Thomas, Ontario, Canada, July 26, 1859. He received his primary education in the city of his nativity and later graduated from Guelph Agricultural College. In April, 1882, he also graduated from McGill University, Veterinary Department, with honors. He

began the practice of his profession in Wheeling, W. Va., where he continued for six years and was there married to Miss Dora Flading.

In 1888, because of a more promising outlook, he moved to Washington, D. C., to practice his chosen profession. He was there appointed veterinarian to the government of the District of Columbia, which position he held until his earthly task was accomplished here; he also served as veterinarian to the War Department.

In 1891 he established a hospital in Washington, and on February 24, 1894, he founded the United States College of Veterinary Surgeons, of which he was president until his death. This institution has grown from one small room to a spacious five-story building, and stands as a monument to his skill, energy, and industry, and from which has gone forth many of his students to various parts of the country, who will cherish his memory and lament his departure.

He was a man of recognized ability and prominence in his profession, and among men, and possessed a high moral character. He was a member of the Virginia State Veterinary Medical Association, the Maryland State Veterinary Medical Association, and the District of Columbia Veterinary Medical Association.

By his integrity and assiduity, he won for himself not only a name in his profession and among men, but a neat little fortune, which he leaves to his children, together with a good name which "is rather to be chosen than great riches."

On December 19, 1921, he died in the 63d year of his age, loved and lamented by all who knew him. He is survived by his widow, one daughter, Mrs. Carrie R. Smith, two sons, Charles and Joseph, all of Washington, D. C., and a host of appreciative and sympathizing friends.

Therefore be it resolved:

First, that this association keenly feels the loss and deeply deplores the going of this eminent and valuable member of our association; and that we bow in humble submission to the wise providence of the Great Physician who makes no mistakes: His will be done.

Second, that a copy of these resolutions be sent to the family of the deceased and that a page in the minute books of this as-

sociation be dedicated to the memory of our beloved fellow-member.

GEO. C. FAVILLE,

H. H. ADAIR,

J. G. FERNEYHOUGH,

Committee.

The time and place of our next meeting was decided upon—Richmond, Va., January, 11 and 12, 1923.

Following the business session, Dr. H. H. Adair, of Bristol, reported on several very interesting cases, as did Dr. C. W. Boone, of Roanoke.

The following morning, with President Willis in the chair, Dr. A. J. Burkholder, of Indiana College, gave a very strong talk on the field preparation of pathological specimens for laboratory diagnosis. This address filled a long felt want and our practitioners were greatly pleased with his suggestions.

Dr. M. Jacob, of the University of Tennessee, gave an interesting address on several of the new diseases making their appearance in his and adjoining states under the head of "Some Observations of Practical Interest." The practitioners greatly enjoyed his discourse and found it very helpful.

Dr. J. W. Adams, of the University of Pennsylvania, gave his clinic, which continued until six o'clock in the afternoon. This was one of the most interesting and instructive features of the program. The members were all loath to leave at the time of the departure of their trains. They all stated that this feature was one of the most helpful that they had attended in many years.

Dr. H. Bannister, of Tampa, Florida, for many years a hard worker of our association and a charter member, having filled every office in the association and having served on our examining board as its secretary for fifteen years, was our guest. It was a great pleasure to have Dr. Bannister with us. It is with deep regret, however, that he is not a resident of the State and an officer of our association and examining board.

Dr. Thomas Fraser, of Richmond, for many years on the examining board, succeeded Dr. Bannister as secretary. Dr. H. H. Adair was appointed by the Governor to fill the vacancy caused by the resignation of Dr. Bannister. The examining board held its regular meeting on the 13th and had before it eight candidates.

On the 14th at 12 o'clock, the association gave a luncheon in the college dining hall. Several tables were attractively arranged by Mr. Owens, college steward. With the assistance of several of the students taking the summer school work, Mr. Owens distinguished himself by serving in a delightful manner.

The following gentlemen responded to toasts: Dr. Adams, University of Pennsylvania; Dr. Jacob, University of Tennessee; Dr. Burkholder, Indiana Veterinary College, and Dr. Handley, Atlanta, Ga.

Our president, Dr. H. S. Willis, of Gordonsville, and Dr. G. C. Faville, of Hampton, gave interesting talks and many of the younger members would have been called on had it not been for the fact that a clinic previously arranged for 1:30 compelled us to adjourn. Several of the members attending the association were accompanied by their wives, who were our guests at the luncheon.

Dr. J. G. Ferneyhough, our State Veterinarian and former president of the association, acted as toastmaster. His usual spicy manner filled the hour with laughter and merriment.

W. G. CHRISMAN, *Secretary*.

NORTH DAKOTA VETERINARY MEDICAL ASSOCIATION

The North Dakota Veterinary Medical Association held a very enjoyable and interesting session July 18 and 19. The place of meeting was at the Veterinary Building of the Agricultural College at Fargo. The principal speakers on the program were Dr. C. P. Fitch and Dr. W. L. Boyd of the University of Minnesota and Dr. J. N. Frost of New York. Dr. Fitch addressed the association on the subject of "Bovine Infectious Abortion," Dr. Boyd on "Sterility" and Dr. Frost, "Diseases of the Udder." These eminent authorities handled their respective subjects in a clear, concise manner and the many questions and the lively, interesting discussions following each of the addresses demonstrated that these conditions are becoming very important in the practice of North Dakota veterinarians. Dr. Boyd made use of a set of lantern slides to demonstrate part of his lecture and also demonstrated the method of diagnosing cystic conditions of the ovaries and how such conditions can be overcome by manipulation. Six sterile

cows and one purebred Belgian mare, taken from the college barns, afforded material for this demonstration. Dr. W. F. Crewe, State Veterinarian, and Dr. H. H. Cohenour, Inspector in Charge of Bureau work in the State, presented a joint report on the progress of the tuberculosis eradication work in the State of North Dakota. This was a very excellent report and was followed by a general discussion which cleared up any obscure points concerning this work. The following officers were selected to head the association for the following year: Dr. Vego Mikkelson of Starkweather, President; Dr. A. F. Elliott of Milton, Vice President; Dr. R. S. Amadon of the Agricultural College, Secretary; and Dr. B. C. Taylor of Hillsboro, Treasurer. The meeting adjourned late in the afternoon of the 19th and many of the members went out to the fair grounds to view the exhibits of the North Dakota State Fair which was being held during that week. All members in attendance at the meeting expressed great satisfaction with the program presented and plans are already under way for a program of equal quality next year.

R. S. AMADON, *Secretary.*

MARYLAND VETERINARY MEDICAL ASSOCIATION

The fourth semi-annual meeting of the Maryland Veterinary Medical Association was held at the University of Maryland, College Park, on July 20 and 21.

During the morning of the first day, Dr. A. F. Woods, President of the University, conducted the early comers through all the college buildings and laboratories. The pathological exhibit of mounted specimens and charts from the Bureau of Animal Industry collection, in the Agricultural building, was most interesting. A short walk to the University dairy buildings then permitted the members and guests to witness the injection of half of the herd for the intradermic tuberculin test, the other half having been injected seventy-two hours before. These latter were examined and, as was to be expected, no reactors found.

Following luncheon in the University Dining Hall, a demonstration of ovariectomy of the bitch was given by Dr. William Collins, of Washington, with a discussion of its complications and after treatment. The suture used for the skin opening, continuous and through the derm only, was new to many. Its

advantages were stated to be that healing was very prompt, the scar small or invisible and that it left no depressions or scars on either side of the median line as is usual with the interrupted suture.

Following the operation, we listened to a most interesting paper by Major John P. Turner, also of Washington, D. C., on "Udder Troubles," and still later to one read for Dr. Pickens, of the University staff on "The More Important Infectious Diseases of Poultry Encountered in Maryland."

Major Turner's very wide experience with dairy cattle is well known and as most of our members engage in cattle practice to a considerable extent, his views were given close attention and the discussion which followed brought out many moot points and profitable experiences.

All freely admitted the importance of the last paper presented, but pleaded a shameful ignorance of the subject.

Following our afternoon session, a banquet was given our members and guests at the University Dining Hall by Dr. Woods. In the more or less relaxed and happy mood which accompanies such a treat, an inquiry was started as to the disposition of certain moonshine rays (or jugs) noted at our last summer's meeting at Deer Park, with no definite result. Dr. W. L. Williams, of Ithaca, New York, concluded our after-dinner speeches with a most sound and sane plea to each veterinarian present to make the most of scientific possibilities and himself an indispensable member of present-day society.

At the business meeting of the association, held following the banquet, our Legislative Committee reported the failure of their efforts to secure the passage of a revised Act to Regulate the Practice of Veterinary Medicine in Maryland; the Committee on Cooperation reported a conference with the State authorities and the probability that the results would be shown in the next issue of the State Regulations Governing Live Stock; and a committee of three was authorized to discuss and report upon a fair and just fee to be charged for tuberculin test work, more particularly the intradermic test.

The next morning the association was treated to a most interesting address by Dr. W. L. Williams, of Ithaca, N. Y., on "The Mating of a Sexually Sound Female with a Sexually Sound Male as the First Principle in the Physiological Reproduction of Young." Dr. Williams made it perfectly clear that

much yet remains to be done before our understanding of this subject will become general. His observations in both breeding studs and dairy herds indicate that the male has been given all too little attention and study and that the sterility of the female does not alone depend upon pathological conditions within her body.

Following a second observation of the herd and luncheon, we were entertained and instructed by Dr. Louis A. Klein, of the University of Pennsylvania, on "Digestive Disturbances of the Rumen of Cattle." Dr. Klein's mastery of this subject is complete and his conclusions logical. His suggestions as to the early recognition and treatment of such conditions were given particularly close attention and led to most of the questions and discussion.

Our association was further honored by the presence of Dr. John R. Mohler, Chief of the Bureau of Animal Industry, who gave us a wonderful word picture of the work of his organization, its past accomplishments and present plans. No veterinarian may see and hear Dr. Mohler without a feeling of hope for and pride in his profession and of respect for himself and his work.

Certainly all present departed with a knowledge of two days profitably spent and a resolution to digest and use what had been so generously given by our contributors and to attend any and all future gatherings of like kind.

HULBERT YOUNG, *Secretary.*

NORTHWESTERN VETERINARY ASSOCIATION

The annual meeting of the Northwestern Veterinary Association, which is composed of the associations of Idaho, Washington, Oregon and British Columbia, was held in the Blue Room of the Hotel Vancouver, Vancouver, B. C., July 21 and 22.

The meeting was called to order by Dr. A. J. Damman, of Vancouver, B. C., President of the British Columbia Veterinary Association. Shortly after the Secretary read a telegram received from Dr. S. F. Tolmie, M. P., stating that owing to indisposition he would be unable to be present, and wishing the meeting every success. Dr. Damman then took the chair and the meeting proceeded as per program. Full discussion took place on all papers; in fact it was late Saturday evening before we concluded a very instructive two days session.

Before beginning the session on Saturday morning, the convention was addressed by Prof. Boving, Acting Dean of Agriculture of the University of British Columbia, who emphasized the value of farming in this Province, and welcomed the members of the convention to the University.

On Friday evening we were fortunate in being addressed by Hon. W. R. Motherwell, Minister of Agriculture for Canada, who was on a tour of the West. Mr. Motherwell told us of some of his early veterinary experiences in Saskatchewan in the early days, one in particular in which he was bitten by a horse affected with glanders, which before the arrival of the veterinarian he did not think had glanders. He said that his trouble was that he could not get enough competent veterinarians at the present time to carry on the work of the Dominion. He concluded by saying that veterinarians could not be expected to do proper work without the proper equipment and facilities and referred to the addition to the Laboratory of the Health of Animals Branch that is being built now at Ottawa.

Mr. Motherwell was given hearty applause and thanks before he left.

I will not attempt to enumerate the names of the veterinarians that discussed each paper, but would mention two that are non-veterinarians.

The program was shown to Dr. P. Mullin, M. D. bacteriologist of the Vancouver General Hospital, and he asked permission to be present to hear the paper and discussion on rabies. This was readily granted and at the conclusion Dr. Mullin gave us some of his experiences with the disease in Montana and Arizona in man and animals, and concluded by relating to the amusement of all about the man in Montana who was protesting that there was no such thing as "rabies" and who came to a meeting for that purpose and put up \$500.00 at the meeting that he could prove it.

This was promptly covered by another \$500.00 by men at the meeting, and he was told he would win the bet if he would go into a room in the basement into which they had previously placed a dog affected with rabies, in anticipation that this gentleman might be present at the meeting. Needless to say, Dr. Mullin told us that the man would not go in.

The other non-veterinarian was Mr. R. Gross, of the Mainland Transfer Company of Vancouver. Mr. Gross assisted Prof.

Hare in the preparation of his paper, "The Economic Value of the Horse versus the Motor," and after it was read told us of his experiences in a large transfer business in which cost accounting system is used, as he said he could tell us what any dray made or lost on any date, each horse, rig and truck having its own separate profit and loss account. He has now only two trucks in his business, and he told us that the horse was far superior to the truck in the transfer business, and gave us the reasons therefor, and told us what other transfer companies were doing in the way of discarding trucks for horses. He concluded by telling us of the truck salesman who wanted to sell him a truck badly, and repeatedly asked permission to give Mr. Gross a demonstration. Finally Mr. Gross said yes he could demonstrate tomorrow morning. He had a lot of canned salmon to unload from the wharf to a warehouse, a short level haul, and he gave him his best swamper to help him and told him that if he could unload as much as two teams that day he would buy his truck. The truck salesman came up to the office at noon and Mr. Gross inquired as to what was the matter. The salesman said he was through. "Why," asked Mr. Gross. The salesman replied, "I always understood that a team of horses could move about two ton, but I never knew before that a team moved *seven* ton at a time." He was a wiser man, and it seems that we veterinarians should wise ourselves up to know what our good friend the horse can do.

Mention had been made previously of a team of heavy work horses that had just recently been sold in Vancouver, B. C., for \$1,200.00, and we had noticed a smile of incredulity on the faces of our American friends. Mr. Gross, on being brought back into the convention room and asked if it were true, said yes, as he sold them himself to a logging company, and that good large horses are in good demand. Mr. Gross regretted he could not stay longer with us, but had to go to an exhibition committee meeting.

Speaking of \$1,200.00 for a team, you would expect to pay much more than that if you went to buy a truck, and it would not do any more work on the short hauls, and cost more in upkeep and depreciation. The object of this paper was to give the veterinarians some figures so as to enable them to intelligently discuss the subject with their clients and so give the other side of the picture to that of the truck and tractor salesman.

On Saturday afternoon we climbed into two touring busses and went around the Marine Drive to the University grounds, where we had a get-together meeting with some poultrymen of British Columbia, who were out there on a field day, and then listened to an address by Dr. Johnson, of Puyallup, Wash., on the "Value of the Veterinarians to the Poultrymen." The poultry industry in Washington and British Columbia has assumed large dimensions and with increased production and forced feeding, diseases are appearing which the veterinarian should study and meet. At the present time the practicing veterinarian knows nothing of poultry diseases and so can not give service, and the poultryman does not think of the veterinarian as being able to assist him. It is the logical work for the veterinarian, but until he becomes competent he can not expect to be called in. On the other hand, the veterinarian says, "If I do go to the trouble and expense to become competent, will the poultryman employ me?" It is a matter of mutual confidence and a getting together which was the object of the meeting, the first of its kind in British Columbia.

We returned and took up resolutions, which were of local interest to the Washington and Oregon members, with the exception that we endorsed again the resolution of the Oregon association inviting the A. V. M. A. to meet in Portland, Oreg., in 1925.

Finally the place of the next annual meeting was discussed. Some favored Eastern Washington and others Oregon, but the Eastern Washington men withdrew their motion, and it will be held in Oregon next year, at a time and place to be decided on by the Secretary of the Oregon association. There were over 65 veterinarians present at the convention which, considering the bad times and the great distances that some had to come, was very pleasing to those that had gone to the trouble of arranging it and preparing the papers. May the next year's meeting be even bigger.

KENNETH CHESTER,

Secretary, British Columbia Association.

SOUTH CAROLINA ASSOCIATION OF VETERINARIANS

The thirteenth annual meeting of the South Carolina Association of Veterinarians was a surprise to its oldest member, Dr. Benj. McInnes. It was held at the Timrod Inn in Charleston, S. C., July 24 and 25.

The meeting was well attended and some very interesting and instructive papers were read.

The evening session consisted of a sumptuous banquet that was enjoyed by all.

On the second day the guests were taken over the city and on a trip to Folly Beach, where they enjoyed surf bathing.

M. R. BLACKSTOCK, *Secretary*.

SOUTHEASTERN STATES VETERINARY MEDICAL ASSOCIATION

The officers of the Southeastern States Veterinary Medical Association met in Chattanooga, July 4, and outlined plans for the coming meeting to be held in Chattanooga on November 20 and 21, this year.

The convention will last two days and particular attention will be given to subjects that interest the practitioner. Several prominent practitioners will be on the program and as a special feature we will invite the next President of the A. V. M. A. and also Dr. John W. Adams, University of Pennsylvania; John R. Mohler, Chief of B. A. I.; Dr. Eichhorn of Lederle Laboratories; G. A. Roberts, Brazil, South America, and Tait Butler of the *Progressive Farmer*.

The afternoon of the second day the association will be in charge of the Chamber of Commerce of Chattanooga, which will entertain the association in an automobile trip to Lookout Mountain, Chickamauga Park and Missionary Ridge.

All veterinarians in the Southeastern States and any others interested in this meeting are especially invited to be present. Programs will be mailed out on October 15. Any communications should be addressed to the Secretary, P. O. Box 1533, Atlanta, Georgia.

JOHN I. HANDLEY, *Secretary*.

Under the heading "The Kind We Sometimes Eat," *The Literary Digest* quotes the following classified advertisement from a Pennsylvania paper: "For Sale—Two thoroughbred Antediluvian roosters."

That skull a half inch thick that was found in Arizona will be sent to Washington. They usually are, you know.—*Life*.

NECROLOGY

Lieut. Lloyd J. Brown was born at De Graff, Ohio, February 15, 1887. He graduated from the Centralia, Kans., high school in 1906, and from the Kansas City Veterinary College in 1910. In 1917 he entered the U. S. Army and crossed with the American Expeditionary Forces as an officer of the Third Division. Following the Armistice, he was sent to Germany with the Army of Occupation. Returning to the United States he chose to remain with the Army and at the time of his death, June 22, 1922, was stationed at Fort Des Moines, Iowa. His death came as a great shock to his family and friends. He had returned to duty after a sick leave of some weeks, perhaps too soon, for his strength collapsed while on duty and died in the Army hospital of heart failure. The funeral service was held Sunday afternoon, June 25, 1922, at the Congregational Church at Centralia, Kans. The service was conducted by Rev. R. D. Bussey, pastor, assisted by Rev. J. E. McClain. The funeral march was played by the Centralia band; music by a mixed quartet. Dr. J. M. Lawson, a former classmate, sang "No Night There." The burial at the Centralia Cemetery was conducted by the Armstrong-Moyer Post of the American Legion with full military honors. Veterinarians attending the funeral were Dr. L. T. Richards of Parsons, Kans.; Drs. Lawson and Crandall of Seneca, Kans.; Dr. H. C. Gale of Clyde, Kans.; Drs. C. H. Burdett and Cecil Wilhoit of Centralia, Kans.

Funeral services for Mrs. William F. Flanary, aged 33, wife of Dr. Flanary, were held at the Catholic church at St. Charles, Minn., and were conducted by the Rev. John Horan. Mrs. Flanary died in a Rochester hospital on July 4, after a protracted illness from Bright's disease.

The British Ministry of Agriculture, in support of a measure pending in Parliament to extend the Government's powers to meet the cost of the existing epizootic of foot-and-mouth disease, estimates that the total cost of this outbreak will not exceed one million pounds sterling.

FOX PARASITES BEING INVESTIGATED

Dr. H. L. VanVolkenberg, who is regularly stationed at the experimental fur farm of the Biological Survey of the United States Department of Agriculture, at Keeseville, N. Y., engaged in investigation of diseases to which silver foxes and other fur bearers are subject in captivity, will be in Washington for the next two months in order to consult literature bearing on the problems upon which he is engaged. Diseases to which fur bearers are subject when reared in captivity are proving an important feature in the development of this industry and the investigations to determine the causative agencies and means of prevention and cure are being pushed vigorously. Doctor Van-Volkenberg has secured valuable material showing the effect of internal parasites on fur bearers, and this will be thoroughly studied as a basis for preventive and curative measures.

VETERINARY PROSPECTS IN SOUTH AMERICA

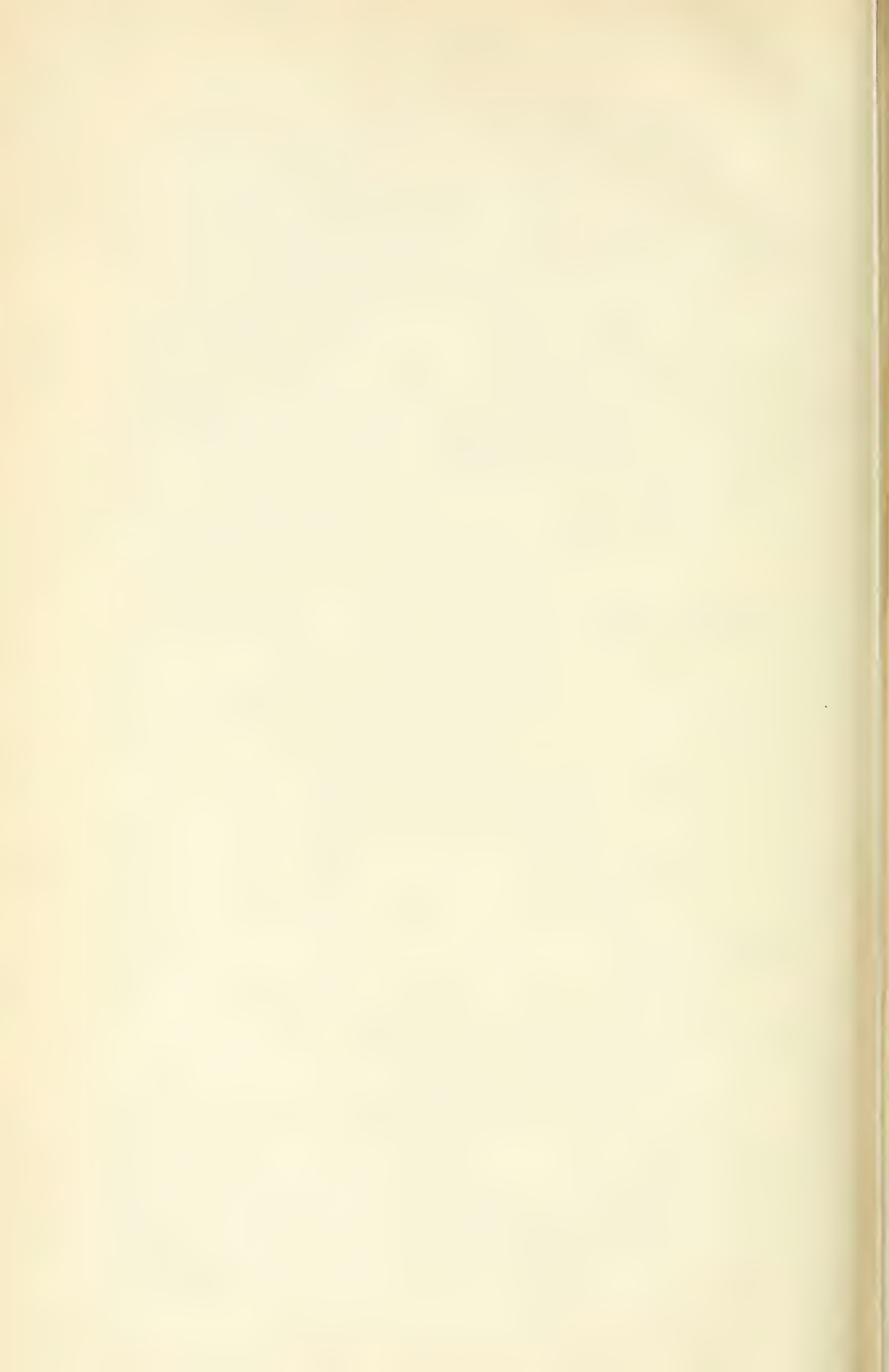
It is interesting to learn from Dr. H. K. Wright, of the H. K. Mulford Company, Philadelphia, that conditions in South America, with reference to livestock, are almost identical with conditions that prevailed in western United States a few years ago. Practically all animals are on range and no attempt is made to secure a veterinarian's services for individual animals. Veterinarians are seldom called, except in connection with outbreaks of dangerous, transmissible diseases.

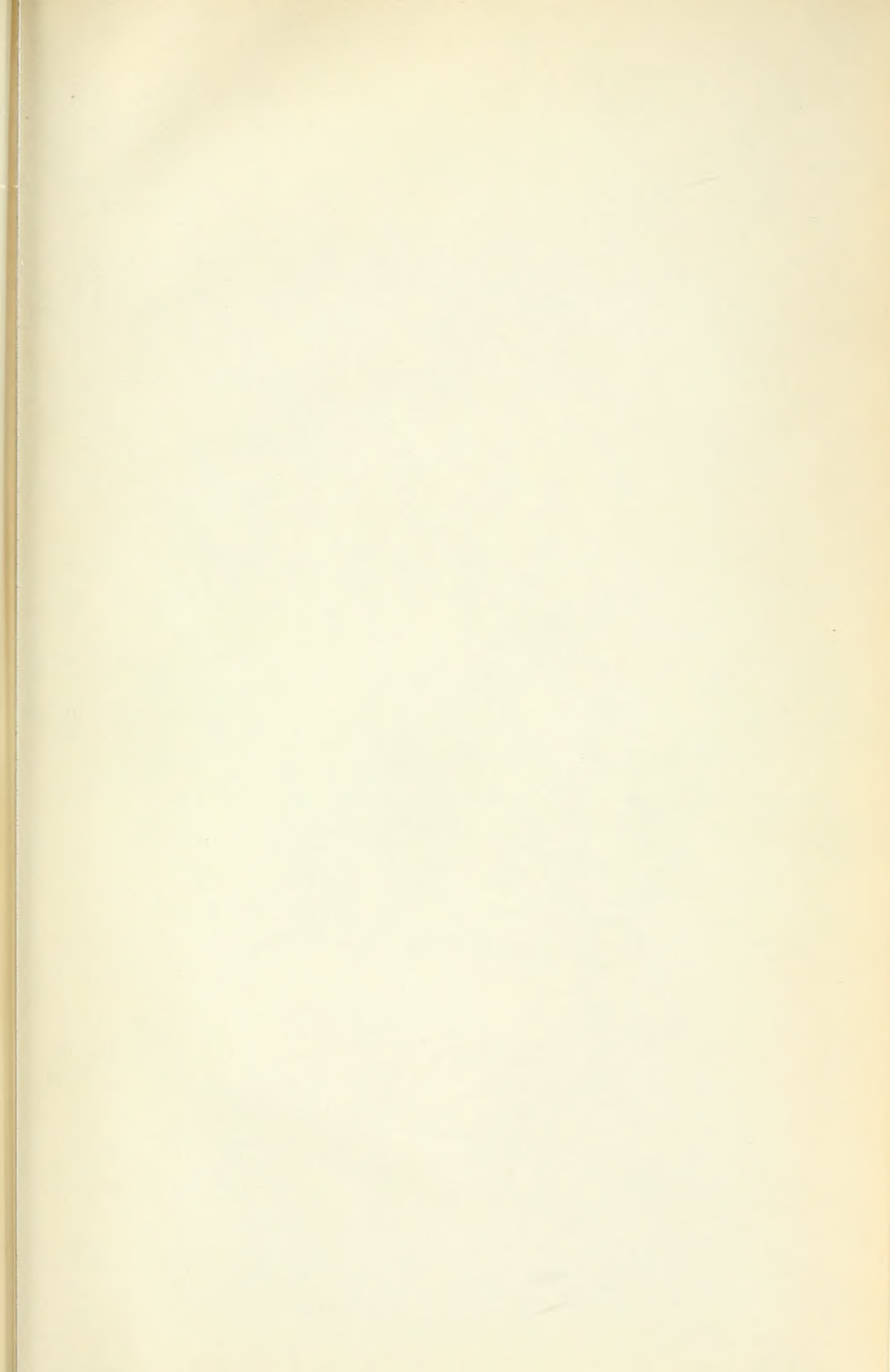
Dr. Wright has just returned to Philadelphia after a sojourn of over 15 months in the Argentine, Chile and Peru. He is of the opinion that present prospects for a veterinary practitioner in South America are not very alluring. It would undoubtedly be a very uphill fight to establish a general practice there.

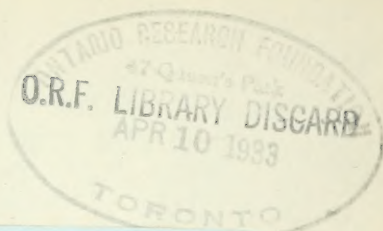
In the first place, a man would have to speak the language of the country very well and a long residence would be necessary for him to become thoroughly acquainted with the customs of the people, their methods of conducting their affairs, etc.

If an opportunity is presented for a veterinarian to take up special work in South America—i. e., for one of the governments, an individual livestock owner, a group of owners or other interests—a definite contract should be entered into, including arrangements for transportation to the U. S. A. upon expiration of the contract.









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